ENTISTRY
LIBRARY

DEC 31 1947

THE Journal OF THE AMERICAN DENTAL ASSOCIATION

JANUARY 1948 • VOLUME 36 • NUMBER 1

CONTENTS

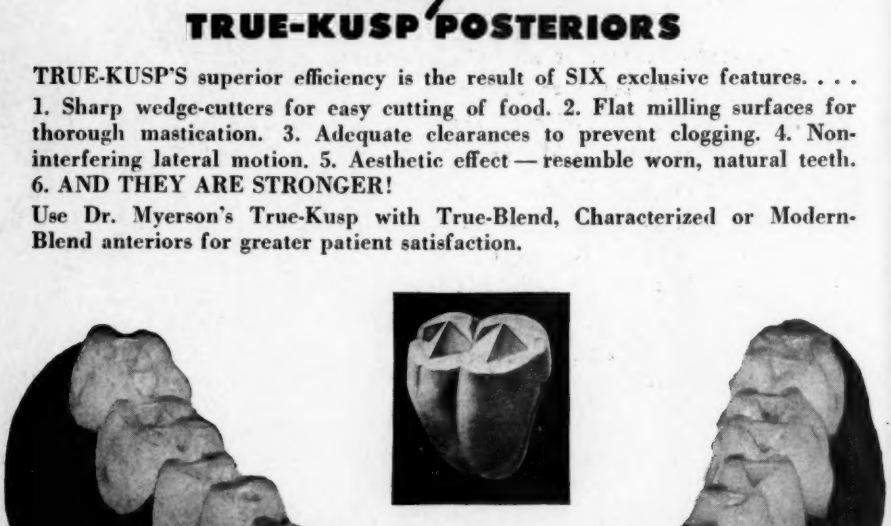
Workshop Technic of Study in Dentistry	*Gruebbel*	1
Michigan Workshop on Dental Caries		3
Effect of Gum Chewing on Teeth	*Volker*	23
Fluorine in Drinking Water and Caries	*Arnold*	28
Application of Sodium Fluoride to Teeth	*Knutson*	37
Dental Public Health Administration: III	*Wisan*	39
Bacteriologic Caries Survey Method	*Hartmann*	53
Pedodontics and Orthodontics	*Lamons*	56
Editorials		64
International Correspondence		69
News of Dentistry		71
Reports of Councils and Committees		86
Cases and Comments		109
Book Reviews		111
Current Literature		116
Army Dental Corps Separations		120
Navy Dental Corps Separations		122
Deaths		124
Directory		126
Announcements		128

Dr. Myerson's

TRUE-KUSP POSTERIORS

TRUE-KUSP'S superior efficiency is the result of SIX exclusive features. . . . 1. Sharp wedge-cutters for easy cutting of food. 2. Flat milling surfaces for thorough mastication. 3. Adequate clearances to prevent clogging. 4. Non-interfering lateral motion. 5. Aesthetic effect — resemble worn, natural teeth. 6. AND THEY ARE STRONGER!

Use Dr. Myerson's True-Kusp with True-Blend, Characterized or Modern-Blend anteriors for greater patient satisfaction.



MYERSON TOOTH CORPORATION · CAMBRIDGE 39, MASS.

The Journal of the American Dental Association, Vol. 36, No. 1. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $7.00 for U. S. and possessions; $8.00 for foreign countries. Single copy seventy-five cents. Entered as second-class matter, May 27, 1942, at the postoffice at Chicago, Ill., under the act of August 24, 1912. Published monthly. Copyright 1948 by the American Dental Association. The Journal of the American Dental Association is indexed in the Index to Dental Literature and, in part, in the Quarterly Cumulative Index Medicus, Biological Abstracts and Chemical Abstracts.

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JANUARY 1948 • VOLUME 36 • NUMBER 1

THE WORKSHOP TECHNIC AS A METHOD OF STUDY IN DENTISTRY

Allen O. Gruebbel, D.D.S., Chicago

For many decades dentistry has progressed as a profession by applying the fundamental principles of learning. Through the learning processes the dental profession has acquired a body of scientific knowledge which it employs to render a health service to the public. The acquisition of knowledge, as well as its application through the many professional activities in which dentists engage, requires continuing study. The avenues by which continuing study are made available to the dental profession include graduate, postgraduate and refresher courses, scientific investigations by individual dentists and groups of dentists and the traditional dental society meeting. All of these methods of study are too well known to justify further description here. Within recent years a new technic for studying and evaluating dental problems, which has met with considerable success, has been introduced into the dental field. This new technic has been given the euphonious name "workshop."

It is a well documented fact that the term "workshop" originated with a group of educators who found need for adapting an ancient study and problem-solving device to a new approach in teacher training through the audience participation principle.[1-8] In adopting the term "workshop" educators apparently intended to describe a type of seminar in which the participants could employ the most effective educational tools for the purpose of acquiring knowledge and, perhaps even more important, of using the information gained in solving school problems. Although the use of this term is relatively new, the basic technic of this type of conference was employed by a number of religious orders centuries ago. In those days retreats were an annual

Executive secretary, Council on Dental Health, American Dental Association.

1. Ryan, W. C., and Taylor, R. W., *Summer Workshops in Secondary Education*. New York: Progressive Education Association, 1939.
2. Heaton, K. L.; Camp, W. G., and Liederich, P. B., *Professional Education for Experienced Teachers*. Chicago: University of Chicago Press, 1940.
3. Otto, H. J., and others, *Community Workshops for Teachers in the Michigan Community Health Project*. Ann Arbor, Mich.: University of Michigan Press, 1942.
4. Hildreth, G. H., Evaluation of a Workshop in Education. *Teachers College Rec.* 46:310 (February) 1945.
5. Tryon, C. M., Summer Workshops. *Elementary School J.* 45:433 (April) 1945.
6. Nutrition Workshop. *School Life* 28:98 (November) 1945.
7. Champlin, C. D., In Praise of Workshop Education. *Nations Schools* 29:45 (January) 1942.
8. Tyler, R. W., Summer Workshops at the University of Chicago. *School Rev.* 50:81 (February) 1942.

affair devoted to group study and meditation.[9]

First Dental Workshop

The first workshop in the field of dentistry was conducted by the University of Michigan in 1944. Approximately a hundred dentists attended this six day conference to study the problems associated with dental health economics. The success of this first dental workshop suggested the idea that this technic could be used with equal advantage by dental societies to study and evaluate any of the subjects in which the dental profession has a special interest. Since December 1946 nine state dental societies have conducted workshops which thus far have been concerned with dental health education and preventive and treatment services for children. Unquestionably, experience has shown that this type of conference can be used with considerable effectiveness by dental societies to conduct concentrated study of any scientific, technical or economic subject.

Professional Seminar

The workshop is a professional seminar which provides for a larger measure of analytical thought and self expression than is offered in the traditional dental meeting. Some of the features of the panel and forum methods of discussion, which give all members of the group an opportunity to participate, are used. In addition, the workshop offers a laboratory setting and develops an atmosphere favoring cooperative work on the part of its members. The principal aims of a workshop are to provide full opportunity for a presentation of essential information, to analyze specific problems and to formulate conclusions.

Second Michigan Workshop

During the week of September 8, 1947, the University of Michigan held its second dental workshop, which was given the title "The Evaluation of Dental Caries Control Technics." Research specialists and dentists, working together, examined scientific literature and exchanged personal views on the cause and control of dental caries. The conclusions of the conference are reported in this issue of THE JOURNAL. The caliber of these reports gives added proof of the effectiveness of the workshop technic and of its adaptability in the field of dentistry.

9. *Encyclopaedia Britannica* 4:327, 1949.

THE MICHIGAN WORKSHOP ON THE EVALUATION OF DENTAL CARIES CONTROL TECHNICS

DURING the week of September 8 to 13, 1947. 114 dentists, physicians, biochemists, nutritionists and dental health educators enrolled at the University of Michigan to attend a workshop on the evaluation of measures for the control of dental caries. This workshop was the twenty-fifth in a series of inservice, noncredit training courses organized by the School of Public Health.

It coordinated the facilities of the School of Public Health with those of the School of Dentistry and the W. K. Kellogg Foundation Institute for Graduate and Postgraduate Dentistry in order to appraise critically the present status of the various control measures now being made available by research and clinical observation. In this week-long program the morning sessions were devoted to lectures by an invited, extramural faculty, and the afternoon sessions were organized in workshop fashion for discussion and evaluation of the information by small groups.

The faculty members, consisting of well-known research workers in the fields of caries control, oral bacteriology, oral histopathology, biochemistry, nutrition and periodontology, presented critical evaluations of the available scientific information concerning their assigned subjects, with a bibliography of references to defend their summarizations. Each morning lecture period was followed by a discussion period in which any participant could join. During the afternoon periods the faculty members were assigned as consultants to the various evaluating groups, along with University faculty members and librarians.

The afternoon sessions were divided between discussion periods and periods of study of the literature. The consultants to the various evaluating committees represented dental research, the basic sciences, nutrition and biostatistics. By Saturday, the thirteenth, the groups had achieved the conclusions regarding the mechanism of dental caries and the methods for its control that can be defended by present scientific information. Six evaluating committees were organized, and each reported its conclusions through its chairman during the final day of the workshop. Group conclusions were discussed, some small changes were made and the reports of all were adopted unanimously.

The subjects assigned to the evaluating groups follow: (1) the mechanism of the caries process, (2) the relation of systemic conditions to the caries process, (3) the effectiveness of prophylaxis, toothbrushing, chewing gum, dentifrices and mouthwashes in the control of caries, (4) the utilization of fluorides and silver salts in the control of caries, (5) the relation of vitamin and mineral ingestion to dental caries and (6) the contribution of various types of diets to caries control.

THE MECHANISM OF THE CARIES PROCESS

Committee I, whose assignment it was to study and report on the mechanism of the caries process, agreed that before attacking the problem of the mechanism of the caries process an acceptable definition of dental caries should be formulated.

After the formulation of the definition it was agreed to consider in chronologic order the various factors concerned in the mechanism of the caries process.

In the preparation of the final report the committee agreed to follow the policy of basing its conclusions on the scientific evidence which has been substantiated by acceptable procedure. However, it also was agreed to include some information which may be an important factor in the mechanism of the caries process but to state that additional evidence is needed to substantiate the opinions based on such information.

Definition

Dental caries is a disease of the calcified tissues of the teeth. It is caused by acids resulting from the action of micro-organisms on carbohydrates, is characterized by a decalcification of the inorganic portion and is accompanied or followed by a disintegration of the organic substance of the tooth. The lesions of the disease predominantly occur in particular regions of the tooth, and their type is determined by the morphologic nature of the tissue in which they appear.

Formation of Acid

The acids involved in the caries process are derived from carbohydrate substances after they have been acted on by microbial enzymes.[1-16] The enzymes have their origin from the microbial flora which has an enzyme system capable of breaking down carbohydrates to acids. Any micro-organism or combination of micro-organisms which is capable of maintaining an acid potential sufficient to decalcify enamel is capable of initiating dental decay.

Micro-Organisms

The following micro-organisms have been found capable of producing this acid potential *in vitro:*[12] lactobacilli, aciduric streptococci, diphtheroids, yeasts, staphylococci and certain strains of sarcina.

The lactobacilli are the only micro-organisms which have been found to show a significant increase in incidence with the initiation of caries.[17-20] Lactic acid has been demonstrated to be present in the caries lesion by a specific method.[5, 21] Phosphoglyceric, pyruvic, formic, acetic, propionic and butyric acids have been demonstrated to be formed by microbial action in saliva-sugar mixtures.[22]

1. Barron, E. S. G., Mechanisms of Carbohydrate Metabolism. Essay on Comparative Biochemistry. *Advances Enzymol.* 3:149, 1943.
2. Fosdick, L. S., and Burrill, D. Y., The Effect of Pure Sugar Solutions on the Hydrogen Ion Concentration of Carious Lesions. *Fort. Rev. Chicago D. Soc.* 6:7 (December 1) 1943.
3. Hanke, M. T., Studies on the Local Factors in Dental Caries. I. Destruction of Plaques and Retardation of Bacterial Growth in the Oral Cavity. *J.A.D.A.* 27:1379 (September) 1940.
4. Kligler, I. J., A Biochemical Study and Differentiation of Oral Bacteria With Special Reference to Dental Caries (1). *Allied* 10:141 (June) 1915.
5. Miller, B. F.; Muntz, J. A., and Bradel, Sigmund, Decomposition of Carbohydrate Substrates by Dental Plaque Material. *J. D. Res.* 19:473 (October) 1940.
6. Miller, W. D., *The Micro-Organisms of the Human Mouth.* Philadelphia: The S. S. White Dental Mfg. Co., 1890.
7. Muntz, J. A., The Production of Acids From Glucose by Dental Plaque Material. *J. Biol. Chem.* 148:295 (April) 1943.
8. Stephan, R. M., Hydrogen Ion Concentration of the Dental Plaque. *J. D. Res.* 17:251 (June) 1938.
9. Stephan, R. M., Intra-Oral Hydrogen-Ion Concentrations Associated With Dental Caries Activity. *J. D. Res.* 23:257 (August) 1944.
10. Stephan, R. M., The pH of Carious Lesions. Abstract. *J. D. Res.* 24:202 (June-August) 1945.
11. Stephan, R. M., Changes in Hydrogen-Ion Concentration on Tooth Surfaces and in Carious Lesions. *J.A.D.A.* 27:718 (May) 1940.
12. Stephan, R. M., and Hemmens, Elizabeth S., Studies of Changes in pH Produced by Pure Cultures of Oral Micro-Organisms. *J. D. Res.* 26:15 (February) 1947.
13. Fosdick, L. S.; Fancher, O. E., and Calandra, J. C., The Effect of Synthetic Vitamin K on the Rate of Acid Formation in the Mouth. *Science* 96:45 (July 10) 1942.
14. Fosdick, L. S., Carbohydrate Degradation by Mouth Organisms. I. *J.A.D.A.* 26:413 (March) 1939.
15. Fosdick, L. S.; Campaigne, E. E., and Fancher, O., Rate of Acid Formation in Carious Areas: The Etiology of Dental Caries. *Illinois D. J.* 10:85 (March) 1941.
16. Fosdick, L. S., and Hansen, H. L., Theoretical Considerations of Carbohydrate Degradation in Relation to Dental Caries. *J.A.D.A.* 23:401 (March) 1936.
17. Jay, Philip, and others, Bacteriologic and Immunologic Studies on Dental Caries. *J.A.D.A.* 20:2130 (December) 1933.
18. Becks, Hermann, Salivary and Bacteriological Considerations in the Control of Dental Caries. *J. Am. Col. Den.* 9:184 (June) 1942.
19. Bunting, R. W., and Palmerlee, Faith, The Role of Bacillus Acidophilus in Dental Caries. *J.A.D.A.* 12:381 (April) 1925.
20. Jay, Philip, Bacillus Acidophilus and Dental Caries. *J.A.D.A.* 16:230 (February) 1929.
21. Miller, B. F., and Muntz, J. A., A Method for the Estimation of Ultra-Micro-Quantities of Lactic Acid. *J. Biol. Chem.* 126:413 (November) 1938.
22. Fosdick, L. S., Unpublished data.

Decalcification

Whether or not the acid formed will decalcify the enamel of a tooth is dependent on the degree of acidity and the time that acid is in contact with the tooth. There is good evidence to indicate that an acid potential in the vicinity of pH 5.0 is sufficient to decalcify the inorganic structure of a tooth.[23, 24] The time that the acid must be in contact with the tooth in order to produce decalcification is not known.

Substrate and Enzyme System

A suitable substrate and enzyme system are necessary for the production of acid.[1-16] The preponderance of evidence indicates that the acids are formed by that which now is accepted as the "anaerobic phase" of carbohydrate degradation.[1-16] It is recognized that other paths of degradation are possible, but as yet they have not been demonstrated to occur in the mouth. The substrate is derived from ingested carbohydrate or carbohydrate from any other possible source. The enzyme systems are known to be derived from the micro-organisms, but they also may be derived from the oral tissues and secretions.

Retention or Dissipation of Acid

The effect of the caries process on the tooth is made possible by circumstances or structures which retain sufficient acid in contact with the tooth substance. These factors, not necessarily listed in their order of relative importance, include (1) the dental plaque, an organic nitrogenous mass containing multitudes of micro-organisms firmly adhering to the teeth,[12, 25-28] (2) the anatomic characteristics of the tooth, (3) the position or arrangement of the teeth in the dental arch and (4) the presence of dental appliances.

Inhibitory Factors

There are also natural factors in the mouth which contribute to the dissipation of acids formed on the tooth surface, such as the amount of saliva and the buffering capacity of the saliva.[29-33] A few reports have suggested that resistance to dental caries in human beings may be accounted for by inhibitory substances.[17, 34-43] Until such a time as more evidence is avail-

23. Enright, J. J.; Friesell, H. E., and Trescher, M. O., Studies of the Cause and Nature of Dental Caries. *J. D. Res.* 12:759 (October) 1932.
24. Holt, L. E., Jr.; Lamer, V. K., and Chown, H. B., Studies in Calcification. I. The Solubility Product of Secondary and Tertiary Calcium Phosphate Under Various Conditions. *J. Biol. Chem.* 64:509 (July) 1925.
25. Blayney, J. R.; Kesel, R. G., and Wach, E. C., Dental Caries. I: New Method of Studying Bacterial Plaque. Abstract. *J. D. Res.* 15:326 (September) 1936.
26. Williams, J. L., A Contribution to the Study of Pathology of Enamel. *D. Cosmos* 39:269 (April) 1897.
27. Williams, J. L., A Contribution to the Study of Pathology of Enamel. *D. Cosmos* 39:353 (May) 1897.
28. Williams, J. L., A Contribution to the Bacteriology of the Human Mouth. *D. Cosmos* 41:317 (April) 1899.
29. Forbes, J. C., Effects of Meals, and the Chewing of Paraffin and Gum, on the Acid-Neutralizing Action of Saliva. *J. D. Res.* 12:749 (October) 1932.
30. Forbes, J. C., and Gurley, W. B., Effect of Diet on the Acid-Neutralizing Power of Saliva. *J. D. Res.* 12:637 (August) 1932.
31. Knighton, H. T., Effect of Various Foods and Cleansing Agents on the Elimination of Artificially Inoculated Yeast From the Mouth. *J.A.D.A.* 29:2012 (November) 1942.
32. Teuscher, G. W., and Fosdick, L. S., The Retention of Reducing Sugars in the Saliva After the Mastication of Carbohydrates. *Northwestern Univ. Den. Res. & Grad. Quar. Bul.* p. 17 (February 4) 1937.
33. Trimble, H. C.; Etherington, J. W., and Losch, P. K., Rate of Secretion of Saliva and Incidence of Dental Caries. Abstract. *J. D. Res.* 17:299 (August) 1938.
34. Appleton, J. L. T., Anti-Infectious Properties of Saliva—A Review. *Am. J. Orthodont. & Oral Surg.* 31: Sec. Oral Surg. 659 (November) 1945.
35. Bunting, R. W., and others, Further Studies of the Relation of Bacillus Acidophilus to Dental Caries (III). *D. Cosmos* 70:1002 (October) 1928.
36. Canby, C. P., and Bernier, J. L., Bacteriologic and Immunologic Studies in Dental Caries: A Preliminary Report. *J.A.D.A.* 29:606 (April) 1942.
37. Hill, T. J., A Salivary Factor Which Influences the Growth of L. Acidophilus and Is an Expression of Susceptibility or Resistance to Dental Caries. *J.A.D.A.* 26:239 (February) 1939.
38. McCollum, E. V., The Diet in Relation to Dental Caries, in *University of Pennsylvania Bicentennial Conference*. Philadelphia: University of Pennsylvania Press, 1941.
39. Miller, W. D., Introduction to the Study of Immunity in Its Relation to the Diseases of the Mouth and Teeth. *D. Cosmos* 45:1 (January); 45:85 (February) 1903.
40. Miller, W. D., Further Experiments Relating to the Question of Immunity. *D. Cosmos* 45:689 (September) 1903.
41. Ross, Victor; Krasnow, Frances, and Samet, Jerome, Agglutinins in Serum and Saliva of Rabbits Inoculated With B. Acidophilus. *J. D. Res.* 7:337 (September) 1927.
42. Thompson, Richard, and Shibuya, Madoka, The Inhibitory Action of Saliva on the Diphtheria Bacillus: The Antibiotic Effect of Salivary Streptococci. *J. Bact.* 51:671 (June) 1946.
43. Williams, N. B., Immunization of Human Beings With Oral Lactobacilli. *J. D. Res.* 23:403 (December) 1944.

able to indicate the identification and action of these factors it is necessary merely to recognize their possible role.

The factor which determines whether or not the caries lesion develops depends on the interrelation of all the preceding variables, so that no single factor may be construed as the general cause of all dental caries.

Once the process as described is initiated, the morphologic characteristics of the lesion are determined by the effect of this process on (1) the anatomic structure and the substances of the tooth, (2) the extent, intensity and duration of the attack and (3) the reaction of the tissues of the tooth. Two common sites of initial lesions are intact enamel and pits and fissures or defects of the tooth.

The first visible evidence of caries on an intact surface of enamel is a change in the optical properties of the enamel. By reflected light this change appears as a whitening, and by transmitted light it is noted as a darkening of the region. Microscopically the rods appear more definite, and the cross striations and incremental lines become more prominent. The substance of the enamel at the surface may be noted to disintegrate, and micro-organisms and debris resulting from the loss of substance may be observed in the interspaces. Pigmentation of the lesion may or may not be noted.[44]

When the process reaches the dentino-enamel junction, expansion of the lesion in this region takes place. Then it progresses through the dentinal tubules toward the dental pulp. At this stage of the process there may be undermining of the overlying enamel. Micro-organisms may precede the process of decalcification of the organic matrix. Small isolated regions of matrix destruction may be observed about some of these microbic masses in the tubules, and these regions may be seen to coalesce. Accompanying this process there is a progressive loss of substance.[6, 44]

Defects in the enamel such as lamellae, certain pits and fissures, and artificially produced defects may afford pathways for the entrance of micro-organisms and may result in caries proceeding from the surface of the defect.[44, 45]

Caries also may begin on the thin layer of cementum and proceed into the dentin.[6, 44]

Respectfully submitted: George W. Teuscher, D.D.S., chairman; Ralph E. McDonald, D.D.S., secretary; Paul W. Clopper, D.D.S., Michael A. Cox, M.D., Allen O. Gruebbel, D.D.S., Olin E. Hoffmann, D.D.S., Hugh R. McLaren, D.D.S., Harold J. Noyes, D.D.S., M.D., Dorothy Permar, M.S., Katharine A. Polevitsky, M.D., and Fred Wertheimer, D.D.S.; Basil G. Bibby, D.D.S., Samuel W. Chase, Ph.D., Mary C. Crowley, M.S.P.H., Robert M. Stephan, D.D.S., Mabel I. Tramp, M.P.H., Ned B. Williams, D.D.S., Helmut A. Zander, D.D.S., and Leonard S. Fosdick, Ph.D., consultants.

Note: No changes in the original statement resulted from the discussion period. It was moved by Dr. Owens that the report be accepted. The motion was seconded by Dr. Gruebbel and was carried unanimously.

44. Kronfeld, Rudolf, *Histopathology of the Teeth and Their Surrounding Tissues*. Philadelphia: Lea and Febiger, 1939.

45. Gottlieb, Bernhard, *Dental Caries*. Philadelphia: Lea and Febiger, 1947.

RELATION OF SYSTEMIC CONDITIONS TO CARIES PROCESS

For the sake of brevity and ease of discussion, the members of Committee II decided to prepare an analysis of the findings and conclusions, with a table showing the approach to the etiologic factors of the caries process.[46-54]

The systemic conditions were divided into seven categories; namely, (1) pregnancy and lactation, (2) general health and nutritional status, (3) diabetes, (4) endocrine glands, (5) infectious diseases, (6) emotional state and (7) constitution and heredity. Each subject was assigned to a subcommittee for a review of the available literature. The committee's discussion periods were devoted to a critical appraisal of individual committee reports. The pattern used in the evaluation of the published material follows:

Etiologic Factors

I. Indirect factors influencing caries
  A. Tooth
    1. Composition
    2. Morphologic characteristics
    3. Position
  B. Saliva
    1. Composition
      a. Organic
      b. Inorganic
    2. pH
    3. Quantity
    4. Viscosity
    5. Antibacterial factors
  C. Diet
    1. Physical factors
      Quality of diet
    2. Local factors
      a. Carbohydrate content
      b. Vitamin content
      c. Fluorine intake
II. Direct causes of caries
  A. Acidogenesis
    Carbohydrate degradation to acid
  B. Proteolysis

Pregnancy and Lactation

Pregnancy and lactation in themselves are not a cause of dental caries. If pregnancy increases the susceptibility or resistance to dental caries, it can do so only by changing the environment of the tooth. Clinical studies indicate that pregnant women do not have a higher rate of caries than do comparable nonpregnant women.

General Health and Nutrition

A careful review of scientific reports reveals that sickness, general health or nutritional status has no significant bearing on the caries process. In fact, several scientific reports reveal that malnourished persons have a decreased incidence of dental caries. Sickness may have a definite influence on the composition, quantity, viscosity and bacterial or antibacterial factors of the saliva, but there is no acceptable evidence to show the influence that these factors may have on the caries process.

Diabetes

It has been stated that prior to the insulin era tooth decay was rampant in persons with diabetes. These reports attempted to link the diabetic state with

46. Biro, S., Untersuchungen über den Einfluss der Gravidität auf die Karies der Zähne. *Oesterr.-ungar. Vrtljschr. f. Zahnh.* p. 371 (October) 1898. Abstract *Den. Rec.* 19:26 (January) 1899.
47. Robinson, H. B. G., Dental Caries and the Metabolism of Calcium. *J.A.D.A.* 30:357 (March 1) 1943.
48. Schour, Isaac, Calcium Metabolism and Teeth. *J.A.M.A.* 110:870 (March 19) 1938.
49. Mull, J. W.; Bill, A. H., and Kinney, F. M., Variations of Serum Calcium and Phosphorus During Pregnancy. II. The Effect on the Occurrence of Dental Caries. *Am. J. Obst. & Gynec.* 27:670 (May) 1934.
50. Ziskin, D. E., and Hotelling, Harold, Effects of Pregnancy, Mouth Acidity, and Age on Dental Caries. *J. D. Res.* 16:507 (December) 1937.
51. Burket, L. W., *Oral Medicine*. Philadelphia: J. P. Lippincott Company, 1946, pp. 292-294.
52. Ziskin, D. E.; Siegel, E. H., and Loughlin, Winifred C., Diabetes in Relation to Certain Oral and Systemic Problems. Part I. Clinical Study of Dental Caries, Tooth Eruption, Gingival Changes, Growth Phenomena, and Related Observations in Juveniles. *J. D. Res.* 23:317 (October) 1944.
53. Boyd, J. D., Long Term Prevention of Decay Among Diabetic Children. *A. J. Dis. Child.* 66:349 (October) 1943.
54. Schour, Isaac, and Massler, Maury, Dental Caries Experience in Postwar Italy (1945). I. Prevalence in Various Age Groups. *J.A.D.A.* 35:1 (July 1) 1947.

Factors to be considered in the relation of systemic conditions to the caries process

Etiologic factors	Pregnancy and lactation	General health and nutrition	Diabetes	Endocrine glands	Infectious diseases	Emotional state	Constitution and heredity
	I. Indirect factors influencing caries						
A. Tooth							
1. Composition	1. None [46-48]	1, 2, 3 During development only [46-48]	1. None 2. None [46-48] 3. None	1, 2, 3 During development only [46-48, 54]	1, 2, 3 During development only [46-48]	1. Unknown 2. Unknown 3. Unknown	1, 2, 3 During development only [46-48]
2. Morphologic characteristics							
3. Position							
B. Saliva							
1. Composition	1. Unknown	1. Unknown	1. Unknown	1. Unknown	1, 2, 3, 4, 5 Variable or unknown [51]	1. Unknown	1. Unknown
2. pH	2. None [49, 50]	2. Unknown	2. Unknown	2. Unknown		2. Unknown	2. Unknown
3. Quantity	3. Unknown	3. Unknown	3. Decreased [51]	3. Unknown		3. Unknown	3. Unknown
4. Viscosity	4. Unknown	4. Unknown	4. Unknown	4. Unknown		4. Unknown	4. Unknown
5. Antibacterial factors	5. Unknown		5. Unknown	5. Unknown		5. Unknown	5. Unknown
C. Diet							
1. Quality	1, 2, 3, 4 Same as in nonpregnant women	1, 2, 3, 4 Same as in normal persons	1, 2, 3, 4 Same as in normal persons except where carbohydrate content is reduced [52-53]	1, 2, 3, 4 Same as in normal persons	1, 2, 3 Same as in normal persons	1. Unknown 2. Unknown 3. Unknown 4. Unknown	1, 2, 3 Same as in normal persons
2. Carbohydrate content							
3. Vitamin content							
4. Fluorine intake							
	II. Direct causes of caries						
A. Carbohydrate degradation to acid (acidogenesis)	Same as in nonpregnant women	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons
B. Proteolysis	Same as in nonpregnant women	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons	Same as in normal persons

tooth decay, with special stress on cervical caries. The committee would like to point out that there have been no modern adequate studies of diabetic children who were not under treatment and that any differences which might be noted were the result of treatment rather than of the disease. All studies seemed to indicate that there was a need for a comparative study of young diabetic patients under various degrees of control and uncontrol.

Endocrine Glands

Endocrine glands occasionally are stated to be involved directly in inducing normal or abnormal tooth structure, in determining the position of the teeth in the arch or in influencing salivary secretions and, through such relationship, have an effect on the resistance or susceptibility to caries. The allusions to these influences are notably general, often are indefinite and frequently are based on assumptions that conditions which modify bone also modify teeth. The committee found no published significant proof or clinical evidence of the relation of endocrine disturbances and the caries index.

Infectious Diseases

Most of the literature on the incidence and progress of caries in patients who are suffering from infectious disease would seem to indicate that the systemic condition has little or no effect on dental caries. Before the indirect effect of systemic disease can be established fully, the relation between hypoplasia of the enamel and caries should be established. However, it is felt by the committee that further research in this aspect of the problem certainly is indicated.

Emotional State

Since there is no clinical or experimental evidence to support the theory that the emotional state may influence dental caries, the committee felt that any further reports should be supported by clinical evidence.

Constitution and Heredity

Although a genetic factor related to caries resistance has been established in laboratory animals, only familial relations have been demonstrated for man. Further study is indicated.

Respectfully submitted: Ruth Martin, D.D.S., chairman; Joseph Cabot, D.D.S., secretary; Harry W. Bruce, Jr., D.D.S., Clifton O. Dummett, D.D.S., Jack M. Earle, D.D.S., Laverne H. Jacob, D.D.S., Edward O. Minniear, D.D.S., Ruth F. Rogers, A.B., Laren W. Teutsch, D.D.S., and Kathryn L. Whyte, D.D.S.; Mildred Harter, A.B., Donald A. Kerr, D.D.S., and Hamilton B. G. Robinson, D.D.S., consultants.

Note: Two minor changes were made in the original statement. Dr. Teuscher moved the adoption of the report. Dr. Strusser seconded this motion, and the motion was approved unanimously.

PROPHYLAXIS, TOOTHBRUSHING, CHEWING GUM, DENTIFRICES AND MOUTHWASHES

Some of the questions submitted to Committee III have been revised and are stated in their revised form in this report. A few of the submitted questions have been deleted, and a few others have been added.

Prophylaxis

Definition: Dental prophylaxis is a process which consists of (1) removal of all foreign material from the clinical crowns of the teeth (all surfaces above the gingival attachment), (2) smoothing and polishing the tooth surfaces by means of scalers, rubber cups and brushes, the porte polisher, dental tape and fine cuttlefish strips when needed and (3) polishing and correction of improper margins of restorations.

The answers which follow are based

on the first two portions of this definition. The literature contains surprisingly little scientific data on prophylaxis as related to dental caries, and, therefore, definite conclusions are not possible at this time.

Question No. 1: Will a prophylaxis remove the bacterial plaques from the teeth?

The literature indicates that thorough prophylaxis will remove bacterial plaques from the accessible surfaces of the teeth but not from the inaccessible surfaces, such as pits, fissures and contact points. The evidence presented is in the form of clinical observations and is not expressed in data which may be subjected to statistical analysis.

Question No. 2: Will a careful prophylaxis performed three times per year reduce the dental caries attack rate?

There is no statistical evidence that prophylaxis three or even more times a year will reduce the dental caries attack rate.

Question No. 3: How frequently should a careful prophylaxis be given to prevent plaque formation? Cavity formation?

Since there is no statistical evidence that prophylaxis will reduce the caries rate, it is impossible to state how frequently it must be provided to prevent cavity formation. Evidence has been presented that plaques will grow back over tooth surfaces in one to four days,[55] which indicates that it is impractical to perform a prophylaxis frequently enough to prevent plaque formation.

Question No. 4: Can the tooth be damaged by prophylaxis?

There is no evidence that dental prophylaxis as usually given at intervals of several months is harmful to the teeth.

Toothbrushing

Question No. 1: What technics may be accepted as satisfactory for brushing the teeth?

55. Stephan, R. M., and Miller, B. F., The Effect of Synthetic Detergents on pH Changes in Dental Plaques. *J. D. Res.* 22:53 (February) 1943.

The acceptable evidence does not show that one technic of toothbrushing is more effective than another for removing foreign material from tooth surfaces. On the basis of clinical observations, many dentists prefer the Charters' vibratory technic, because of its supposed superior polishing of interproximal surfaces. This method is difficult to learn and probably is not performed well by children or by the adults who will not spend the necessary time.

Since no single procedure has proved to be ideal, selection should be made on the basis of the needs of each patient. Toothbrushing can be more pleasant and effective with an acceptable dentifrice. Few studies have been made of the value of the toothbrush alone.

The following technic has been used for many years and is suggested by some as adequate for the average young child. A vibratory method (Charters') can be taught to the child later in life.

The brush should have a straight handle, with a small head (perhaps 1¼ by ⅜ inches) with two rows of bristles, each row having four or five tufts carefully trimmed to the same height. The brush should be small enough to be handled with ease; children should be given smaller brushes than adults.

The teeth should be brushed in a definite order, to be certain that all areas are covered. The occlusal surfaces are brushed first, a sweeping motion forward and backward being used. first in the upper and then in the lower jaw. The other surfaces are brushed with a rolling motion. The sides of the bristles are placed against the gingival tissue in the upper left molar region, and the teeth are brushed downward (occlusally), slight pressure being used when the bristles touch the buccal surfaces of the teeth. Three to six strokes are given to each area in the following manner: (1) brush the upper left molar region; (2) move the brush anteriorly and brush the buccal surfaces of the teeth

around to the right molar region; (3) brush the palatal surfaces of the upper teeth, starting on the right side and continuing around to the left side; (4) brush the lower teeth from the gingival tissue upward (occlusally) beginning with the lower left molars and continuing anteriorly and around to the lower right molar region; (5) brush the lingual surfaces similarly in like sequence from right to left.

Question No. 2: Will these technics harm the teeth?

There is no scientific evidence available that these technics, correctly applied, will harm the teeth or cause gingival recession.

Question No. 3: How often should the teeth be brushed?

There is evidence that teeth should be brushed immediately after each ingestion of food.

Question No. 4: For how long a period at each brushing?

No definite length of time has been established as ideal for toothbrushing, because the time will vary from patient to patient. Probably the average young adult should brush each area six to eight times, and children should brush each area three to six times.

Question No. 5: When should the teeth be brushed?

Answered under No. 3.

Questions No. 6 and 7: These questions were consolidated and changed to read: Will brushing immediately after the ingestion of sugar reduce the amount of acid formed?

There is evidence in the literature that toothbrushing under these circumstances will reduce the total amount of acid produced. It has been stated that toothbrushing will remove most of the accessible plaque material, leaving so little that a satisfactory measurement of pH change cannot be obtained.[55, 56] Hence, one could assume that there would be less acid produced after toothbrushing.

Question No. 8: Will toothbrushing prevent the formation of dental plaques?

There is no evidence that toothbrushing as ordinarily performed will prevent the formation of dental plaques.

Question No. 9: Will it remove them from accessible surfaces of the teeth?

Most bacterial plaques can be removed from accessible surfaces of teeth by toothbrushing. However, scientific evidence that toothbrushing can remove all plaques from the accessible surfaces of the teeth is lacking. Bacterial plaques usually re-form rapidly.

Question No. 10: Will it reduce the count of acidogenic bacteria?

There is no evidence that the count of acidogenic bacteria will be reduced for an appreciable time by toothbrushing, although a temporary reduction will result.

Question No. 11: What, if any, is the reduction in the caries attack rate that may be expected from a toothbrushing program?

There is little scientific evidence that a reduction in the caries attack rate may be expected from a toothbrushing program. However, the possibility that adequate toothbrushing may reduce the incidence of dental caries should not be ignored.

Chewing Gum

Question No. 1: Does the use of commercial chewing gum reduce the number of acidogenic organisms in the saliva?

The committee could find no satisfactory evidence that the use of a commercial chewing gum reduced the number of acidogenic bacteria in the saliva, nor could it find any scientific data which indicated that the chewing of gum might stimulate such organisms. There is conjecture in the literature that chewing gum is both harmful and beneficial, but there is no acceptable evidence to support the conjectures.

56. Stephan, R. M., Changes in Hydrogen-Ion Concentration on Tooth Surfaces and in Carious Lesions. *J.A.D.A.* 27:718 (May) 1940.

Question No. 2: How much sugar may be found in chewing gum?

The sugar content of commercial chewing gum is approximately 60 per cent by weight.

Question No. 3: Is chewing gum a caries-producing agent?

There is little evidence that can be cited to answer the question of promotion of dental caries by chewing gum. According to the only available findings,[56] chewing gum was apparently harmful to one group of the population and harmless to another. Gum which contained calcium carbonate seemed to have a less harmful effect than gum without it. However, the evidence that has been offered is not sufficient to justify any conclusion.

Question No. 4: Is an anticaries agent more effective as a mouthwash than when incorporated in chewing gum?

No comparative studies have been made and much would depend on the agent used for caries control. An agent being slowly liberated from chewing gum would have a more prolonged effect than if used in a mouthwash. However, the stimulation of salivary flow produced by the chewing process might have a serious diluting effect on the inhibiting agent. In the opinion of the committee, much would depend on the nature of the anticaries agent.

Question No. 5: In a lozenge?

There is no satisfactory evidence to show any anticaries superiority or even a retarding influence when the agent is employed in a lozenge. The lozenge would permit a more prolonged contact with the teeth. On the other hand, the danger of toxicity from an agent incorporated either in a lozenge or in chewing gum probably would be greater than in a mouthwash, because it would be swallowed.

Question No. 6: Is there sufficient evidence that fluoride incorporated in chewing gum reduces the caries attack rate?

There is no evidence that sodium fluoride in a chewing gum is effective as an anticaries agent.

Question No. 7: Menadione (synthetic vitamin K)?

There is some indication that menadione may reduce the incidence of dental caries but the evidence currently available is not sufficient to justify any conclusions. In the only available report chewing gum was used immediately after the ingestion of food.[57] Those who chew gum do not always use it in this manner. An objection to the widespread use of this means of treatment might be that many persons are averse to the use of chewing gum for esthetic reasons. Still another possible objection is the tendency of gum to stick to acrylic restorations.

Question No. 8: At what times during the day should either be chewed?

Further study is necessary before any general use of chewing gum is justified.

Question No. 9: Is the human organism likely to suffer a shortage of vitamin K?

Deleted.

Question No. 10: Will chewing gum clean the teeth more effectively than will the foods eaten by civilized persons?

A thorough search of the literature reveals no evidence which would justify the conclusion that chewing gum has a greater cleansing effect on the teeth than the natural foods in the diet of civilized persons.

Question No. 11: Would the use of menadione in chewing gum be harmful?

The available evidence indicates that menadione, used frequently in small amounts, would not be toxic. However, until more extensive studies have been conducted, especially on human beings, no conclusions are justified.

Dentifrices

Definition: A dentifrice is a substance designed to help the toothbrush clean

57. Burrill, D. Y., and others, The Effect of 2-Methyl-1, 4-Naphthoquinone on the Incidence of Dental Caries. *J. D. Res.* 24:273 (December) 1945.

the accessible surfaces of the teeth. Some dentifrices may contribute to the establishment or maintenance of a normal structure or function of the mouth.

Question No. 1: Combined with toothbrushing, will any of the dentifrices prevent the formation of plaques on those surfaces of teeth accessible to the bristles?

The reported evidence substantiates the conclusion that dentifrices will contribute to the prevention of plaque formation on those surfaces of the teeth which are accessible to the bristles of the toothbrush. However, the proper use of a dentifrice with a toothbrush will not prevent entirely the formation of some plaques. The literature leads us to conclude that a dentifrice which contains an abrasive is more effective in a given length of time and that the brushing technic is more important than the dentifrice.

Question No. 2: Combined with toothbrushing, will any of the dentifrices remove such plaques?

Removal of accessible plaques has been demonstrated satisfactorily.

Question No. 3: Incorporated in a dentifrice, will dibasic ammonium phosphate reduce the number of oral lactobacilli?

A dibasic ammonium phosphate dentifrice, when used in combination with a like mouthwash, produced a significant reduction in the count of oral lactobacilli. However, it would be desirable to have confirmatory evidence as well as a clinical demonstration of reduction of the incidence of caries.

Question No. 4: Penicillin?

No evidence on human beings is reported in the published literature on penicillin. According to one published article[58] and other reports which have not been published, penicillin, when incorporated in a dentifrice, contributes to the reduction of oral lactobacilli in animals and man. The evidence as yet is insufficient to show that it produces a decrease in the incidence of dental caries in human beings. The use of penicillin dentifrices is an interesting experiment, but until further evidence is available concerning its allergic manifestations and its influence on other bacteria and until it has been demonstrated to reduce the incidence of caries in human beings, its use should be considered purely in the experimental stage.

Question No. 5: Other antibiotics?

There is inadequate evidence on which to base an opinion of the value of other antibiotics in the control of caries, although it is known that oral lactobacilli are in some degree sensitive to streptomycin and to tyrothricin.

Question No. 6: Fluorides?

Only two articles on the use of fluorine in dentifrices appear in the literature.[59, 60] One article reports no reduction in oral lactobacilli and no significant reduction in the incidence of dental caries. The other article reports a reduction in oral lactobacilli, but the evidence that a substantial reduction occurred is not convincing. The committee concludes that the available evidence does not justify the use of fluorine dentifrices.

Question No. 7: How frequently should the dentifrice be used?

There is nothing in the literature that establishes how frequently a dentifrice should be used. However, there is some evidence that plaques which remain in the mouth may become impregnated with inorganic material and thus become difficult to remove. Therefore, one might reason that the more frequently a dentifrice is used, the greater its cleansing effect. In all probability, great variation is found in different mouths.

Question No. 8: How permanent is the effect?

58. McClure, F. J., and Hewitt, W. L., The Relation of Penicillin to Induced Rat Dental Caries and Oral L. Acidophilus. *J. D. Res.* 25:441 (December) 1946.

59. Shaner, E. O., and Smith, R. R., Clinical and Bacteriological Studies of the Use of a Fluoride Dentifrice. *J. D. Res.* 25:121 (June) 1946.

60. McClendon, J. F., and Foster, William, Prevention of Dental Caries in Rats by Brushing Their Teeth. Abstract. *J. D. Res.* 25:183 (June) 1946.

All available evidence points to the conclusion that the effect of currently available commercial dentifrices is transitory.

Question No. 9: Has a reduction in caries attack rate been demonstrated?

If lactobacillus counts can be accepted as an expression of the caries attack rate, the evidence examined demonstrates that there is substantial reduction in the caries attack rate when certain medicated dentifrices are employed. Laboratory evidence has shown a reduction in the incidence of caries when commercial dentifrices were used to brush the teeth of hamsters.[61]

Mouthwashes

Definition: A mouthwash is any fluid suitable for use in rinsing the oral cavity.

Question No. 1: Will rinsing the mouth with tap water reduce the oral bacteria per cubic centimeter of saliva?

Rinsing the mouth with tap water may reduce the bacterial content temporarily by mechanical means and may dilute the bacterial substrate. It has not been shown that the effect of tap water is clinically significant.

Question No. 2: What substances, which may be incorporated in mouth rinses, will reduce the number of oral lactobacilli measurably?

Urea (4 per cent) and quinine (0.05 per cent), urea (3 per cent)-diammonium phosphate (5 per cent) rinse, and urea in 40 to 50 per cent concentration.[62]

Question No. 3: Are these substances now toxic to patients?

Relatively, yes. The toxicity of urea is low, the clinical dose permitted being 15 to 60 gm. a day. There is small likelihood that this substance, used in a dentifrice or mouthwash, will cause toxic manifestations. In a series of patients, concentrations of urea up to 95 per cent were used in a dentifrice for several months with no evidence of toxicity or irritation of the oral mucous membranes. If the urea is combined with urease in a dentifrice, as has been reported, irritation of the oral mucosa could result from the rapid conversion of urea into ammonium carbonate.

Question No. 4: Are there any substances which, when incorporated in a mouth rinse, penetrate the dental plaque and inhibit or destroy the activity of acidogenic organisms within the plaque?

Most antiseptics may penetrate the plaque slowly and may be expected to destroy some of the susceptible organisms in the plaque, but this phenomenon has not been shown to result in a reduction of the incidence of dental caries. The available information indicates that some plaque material is not penetrated easily by chemical agents suitable for use in the mouth.

Question No. 5: Do any of these substances disintegrate the plaque?

It has not been shown that any substance which is suitable for use in a mouth rinse will disintegrate the plaque.

Question No. 6: Do dibasic ammonium phosphate, sodium fluoride, urea, zephiran and quinine destroy or reduce the number of acidogenic organisms?

When used as mouthwash ingredients, it is probable that all of the agents mentioned except sodium fluoride may have a measurable effect on the number of oral lactobacilli. It has not been shown conclusively that such effect will result in a measurable reduction in the incidence of caries.

6,a: The question was changed to read: What is the optimum frequency of use?

The optimum frequency is not known.

6, b: How long does the effect maintain after the mouthwash is discontinued?

The available evidence indicates that the effect is transient.

61. Zander, H. M., In press.

62. Stephan, R. M., The Effect of Urea in Counteracting the Influence of Carbohydrates on the pH of Dental Plaques. *J. D. Res.* 22:63 (February) 1943.

6, c: Is each practical for the patient to use?

Aside from lack of palatability to some patients, they are convenient to use.

6, d: Can a reduction in caries attack rate be demonstrated by the use of any of these agents?

Deleted.

Summary

Maintenance of oral hygiene by means of dental prophylaxis and toothbrushing with acceptable aids can be recommended for numerous reasons, although the evidence that such measures are effective in the prevention of dental caries is limited and, at present, inadequate.

Respectfully submitted: Floyd D. Ostrander, D.D.S., chairman; Donald A. Wallace, Ph.D., secretary and consultant; Philip D. Adams, Ph.D., Lloyd C. Blackman, D.D.S., Glenn E. Cartwright, D.D.S., Robert A. Downs, D.D.S., Henry C. Gage, D.D.S., Evan C. Howell, D.D.S., Harvey C. Janke, D.D.S., Levi H. Johnson, D.D.S., Gordon A. Smith, D.D.S., Mary L. Soule, M.A., Harry Strusser, D.D.S., Joel Vugteveen, D.D.S., Walter S. Weisz, D.D.S., and Virginia Winterhoff, D.D.S.; Marguerite F. Hall, Ph.D., Thomas J. Hill, D.D.S., and Robert G. Kesel, D.D.S., consultants.

Note: Names were deleted from the original statement and a reference to "aciduric organisms" was changed to "oral lactobacilli." Dr. Teuscher moved the adoption of the report. The motion was seconded by Dr. Janke and received unanimous approval.

FLUORIDES AND SILVER SALTS IN CARIES CONTROL

Committee IV considered the use of fluorides and silver salts in the control of caries.

Fluorine in Water Supply

The inverse relation between the consumption of fluoride-bearing domestic water and the prevalence of dental caries in children has been established. The evidence indicates that the D.M.F. rate is approximately 60 per cent lower in children aged 12 to 14 years who, throughout life, have ingested communal water containing about 1.0 part per million of naturally-borne fluorides (F.). Caries reduction is most marked in the upper anterior teeth, in which the number of D.M.F. surfaces may be lowered by as much as 90 per cent. The reduction is markedly less in the posterior teeth. Some caries-inhibiting effect is observed in areas where the communal water contains as little as 0.5 p.p.m. of fluoride. It becomes more pronounced as the fluoride concentration is increased, though little additional benefit is obtained from concentrations above 1.0 to 1.5 p.p.m. Above this level dental fluorosis may become evident.

The evidence indicates that no toxic effect follows consumption of water containing up to 1.0 p.p.m. of fluorides and that no known toxic effect other than a mild dental fluorosis follows ingestion of water in the 1.0 to 1.5 p.p.m. range. Although progressively severe dental fluorosis may be expected at higher levels, systemic fluoride toxicosis has not been demonstrated on the North American continent after continued usage of waters containing up to 4.0 or 5.0 p.p.m. of fluorides.

The mechanism whereby the inhibiting effect is exerted is not clearly understood.

Lactobacillus counts on groups of persons in fluoride areas are consistently lower than the counts of comparable groups in areas where the communal water contains little or no fluorine. Among persons with continuous residence in a fluoride area teeth with fluorosis are no more resistant to dental caries than are teeth with enamel having a normal appearance. Chemical analyses indicate that mottled enamel has a higher fluoride content than normal enamel and that the enamel of noncarious teeth con-

tains more fluoride than that of carious teeth, even when the teeth under study have been extracted from the same mouth. Evidence is not available to indicate whether the teeth of the child are affected when fluorides are ingested by the mother. There is some evidence that residence in a fluoride area confers some immunity to caries, even in persons who had used fluorine-free water during the period of enamel calcification. Whether artificial fluorination of water will produce the same reduction in caries as naturally occurring fluoride waters is not known.

A statement made in 1942 remains true today: "There is no direct evidence demonstrating whether or not the addition of fluorine to a fluorine-free community water supply will decrease the incidence of dental caries in the community."[63] Studies designed to test the efficacy, safety and practicability of fluorinating a community water supply are now under way in several communities.

Topical Application

Caries reductions of approximately 40 per cent have been observed in the teeth of groups of children treated topically with solutions of sodium fluoride.

An acceptable technic should include cleaning and drying the teeth and applying a 2 per cent solution of sodium fluoride (C.P.) which is allowed to dry for three minutes. The maximum protective effect is attained after a series of four treatments, only the first of which is preceded by a prophylaxis.

The protective effect of the treatment continues for three or more years. The topical treatment does not produce fluorosis and does not injure the gingival tissues, and fluorine is not absorbed in harmful amounts as a result of the treatment.

63. Arnold, F. A., Jr.; Dean, H. T., and Elvove, Elias, Domestic Water and Dental Caries. IV. Effect of Increasing the Fluoride Content of a Common Water Supply on the Lactobacillus Counts of the Saliva. *Pub. Health Rep.* 57:773 (May 22) 1942.

As in the case of natural fluoride waters, the mechanism whereby topically applied fluorine exercises its protective effect is obscure.

There is no evidence as to whether or not topically applied sodium fluoride will confer any additional caries protection to teeth which have calcified during residence in a fluoride area.

Fluorine in Food

Experimental evidence indicates that fluorides in food are less fully utilized than fluorides in water. The evidence does not indicate that foods grown in different geographic areas show any wide variation in fluoride content.

Although bone meal contains fluorine, it has not been established as a good source of this element, and there is insufficient evidence that caries can be controlled either in children or in adults by its use. Nor does the evidence today support the recommendation for the control of caries in children or adults by the use of any other proprietary product containing fluorine for self administration or for home use.

Toxicity of Fluorides

Fluorine is toxic, but in the strengths and amounts recommended in this evaluation its use in skilled hands is without danger to the patient.

Fluorine in Prophylaxis Paste

On the basis of the evidence of preliminary investigations, there may be some caries-inhibitory effect after the use of sodium fluoride mixed with pumice as a prophylaxis powder or paste.

Silver Nitrate

It has not been demonstrated adequately that the incidence of dental caries can be reduced or that progress of the caries lesion can be retarded by the topical application of silver nitrate.

There is evidence that silver nitrate alters both the organic and inorganic constituents of dental enamel, but there is insufficient evidence that these alterations have any value in the control of dental caries. The use of a wetting agent has no proved value.

Respectfully submitted: Albert L. Russell, D.D.S., chairman; Evans G. Nelson, D.D.S., secretary; A. Paul Atkins, D.D.S., Harry K. Brown, D.D.S., John E. Chrietzberg, D.D.S., Sydney B. Finn, D.D.S., Kenneth R. Gibson, Sr., D.D.S., Edmund A. Grant, D.D.S., John W. Holt, D.D.S., Foster W. Matteson, D.D.S., James F. Owens, D.D.S., Alfred E. Russell, D.D.S., Annie J. Taylor, Edward Taylor, D.D.S., James A. Thrash, M.D., and Chester V. Tossy, D.D.S.; Francis A. Arnold, Jr., D.D.S., Basil G. Bibby, D.D.S., John W. Knutson, D.D.S., and Helmut A. Zander, D.D.S., consultants.

Note: Two minor deletions were made from the original report during the discussion period. It was moved by Dr. Teuscher that the report be adopted. The motion was seconded by Dr. Seyler and received unanimous approval.

VITAMIN AND MINERAL INGESTION

Committee V, in its deliberations and conclusions, has proceeded on the basis of the following premise: Any effects derived from the ingestion of vitamins and minerals must be considered intrinsic in character and manifested, in their relation to dental caries, as (1) variations in the structure, form or composition of the teeth, produced during the period of tooth formation, or (2) variations in the saliva or other factors comprising the environment of the teeth, produced during any period of life.

The committee, after consideration of the evidence submitted by the essayists during the conference and after a limited search of the literature, submits the following general conclusion:

The ingestion of vitamins and minerals, in amounts in excess of those required for a normal diet, has not been demonstrated to have any relation to dental caries.

The committee, concluding that answers to the evaluative questions proposed by the general planning committee would be helpful in serving the several purposes of the conference, submits the following additional conclusions with reference to, and in the numerical order of, the specific questions:

I. The vitamins

A. Vitamin A

1. With positive signs of vitamin A deficiency, do children exhibit an increased dental caries attack rate?

   There is no evidence that vitamin A deficiency causes an increase in the dental caries attack rate in children.[64-67]

2. During the period of tooth formation, does a mild chronic deficiency of vitamin A affect the structure of the hard tissues or the shape of the teeth?

   Chronic mild deficiencies of vitamin A have no significant effect on the structure of the hard tissues or the shape of the teeth. However, chronic severe deficiencies of vitamin A produce characteristic abnormalities in the structure and form of the enamel and dentin of developing teeth of animals. It is doubtful whether avitaminosis A of a degree and duration required to produce

64. Wolbach, S. B., and Howe, P. R., Incisor Teeth of Albino Rats and Guinea Pigs in Vitamin A Deficiency and Repair. *Am. J. Path.* 9:275 (May) 1933.
65. Mellanby, May, and Pattison, C. L., Action of Vitamin D in Preventing Spread and Promoting Arrest of Caries in Children. *Brit. M. J.* 2:1079 (December 15) 1928.
66. Bloch, C. E., Vitamin A Deficiency and Dental Anomalies in Man. *Acta paediat.* 11:535, 1930.
67. Shourie, K. L., Dental Caries in Children in Madras City in Relation to Economic and Nutritional Status. *Indian J. M. Research* 30:561 (October) 1942.

similar dental disturbances occurs in the infant or could be tolerated by the infant. The only authenticated report of a dental disturbance in a human being that was caused by vitamin A deficiency was reported by Boyle,[68] who examined a premature infant whose nutrition was unusually poor.

B. Vitamin B complex

1. Do children with positive signs of multiple B deficiency exhibit an increased dental caries attack rate?
2. A reduced caries attack rate?

There is no evidence or even a suggestion in the literature that a deficiency of vitamin B or any of its components has any effect on the dental caries attack rate. The vitamin B complex is concerned primarily with the soft tissues, including gingiva, tongue and mucous membrane, and there is no evidence of a relation between vitamin B complex and the enamel or dentin of the teeth.[69-71]

C. Vitamin C

1. What effect, if any, does a deficiency of vitamin C have on developing teeth in man?

There is no evidence in the literature that a deficiency of vitamin C has any effect on the developing teeth of man, but in experimental animals with a deficiency in vitamin C changes occur which result in loss of formation of intercellular substance with development of amorphous and irregular dentin.[72-74]

2. Will the daily ingestion of large amounts of vitamin C reduce the caries attack rate?

That the daily ingestion of large amounts of vitamin C reduces the dental caries attack rate has not been substantiated in the literature. Hanke's experiments were reported to show these results, but his work has not been corroborated.[75-77]

D. Vitamin D

1. Will fortification of the diet with vitamin D during tooth formation reduce the caries attack rate?
2. After tooth formation?

It has been rather clearly demonstrated that vitamin D is of value in the formation of hard dental structures including the teeth themselves. There is evidence to suggest the possibility of increased susceptibility to caries attack in teeth which have been formed during a condition of vitamin D deficiency.

Evidence that this vitamin aids in the maintenance of the fully formed teeth or in the prevention or retardation of dental caries at any stage of its progress is not supported by observations that have

68. Boyle, P. E., Manifestations of Vitamin-A Deficiency in a Human Tooth-Germ. *J. D. Res.* 13:59 (February) 1933.

69. Becks, Hermann, and Morgan, Agnes F., The Effect of Deficiencies of the Filtrate Fraction of the Vitamin B Complex and of Nicotinic Acid on Teeth and Oral Structures. *J. Periodont.* 13:18 (January) 1942.

70. Goll, H., Zur Frage der Verhütung der Zahnkaries. *Med. Klin.* 36:712 (June 28) 1940.

71. Kniesner, A. L.; Mann, A. W., and Spies, T. D., Relationship of Dental Caries to Deficiencies of the Vitamin B Group. *J. D. Res.* 21:259 (June) 1942.

72. Boyle, P. E., The Tooth Germ in Active Scurvy. Abstract. *J. D. Res.* 14:172 (June) 1934.

73. Westin, G., Scorbutic Changes in the Teeth and Jaws in Man. *D. Cosmos* 67:868 (September) 1925.

74. Howe, P. R., Studies of Dental Disorders Following Experimental Feeding With Monkeys. *J.A.D.A.* 11:1149 (December) 1924.

75. Hanke, M. T., Diet as a Factor in Control of Gingivitis; and Diet as a Factor in Control of Dental Caries: A Report on Nutritional Studies at Mooseheart, Illinois. Abstract. *J. D. Res.* 12:518 (June) 1932.

76. Hanke, M. T., *Diet and Dental Health.* Chicago: University of Chicago Press, 1933.

77. Grandison, W. B.; Stott, L. B., and Cruickshank, D. B., An Investigation Into the Influence of Synthetic Vitamin C as a Controlling Factor in the Incidence of Dental Caries in Already Calcified Teeth. *Brit. D. J.* 72:237 (May 15) 1942.

passed beyond the controversial stage.[78-80]

3. What happens when patients take excessively large doses of vitamin D?
   Recently numerous cases of serious renal disturbances have been reported to have resulted from the administration of massive doses of vitamin D given as therapy for arthritis.[81]
4. Is there any difference in the patient's caries attack rate when he receives his vitamin D as sunshine, as cod-liver oil or as concentrates such as viosterol?
   There is no conclusive evidence to indicate that there is any significant difference in the caries attack rates of patients who receive vitamin D from sunshine, cod-liver oil or irradiated ergosterol.[82, 83]
5. Do people living in civilized urban communities of sunny areas have fewer cavities than those living in comparable communities of cloudy areas?
   Since it is possible that other geographic factors may influence differences in caries attack rates, there is not enough conclusive evidence in the litterature to indicate that sunshine is the only factor involved in determining geographic differences in dental caries attack rates.[84-86]
6. Are more hypoplastic teeth found in the mouths of rachitic children than in the mouths of nonrachitic children?
   It is probable that more hypoplastic teeth occur in the mouths of rachitic children than of nonrachitic children. Recent studies, however, suggest that there is no correlation between hypoplasia of the teeth and rickets or vitamin D deficiencies occurring during tooth formation.[79, 80]
7. Ordinarily, is the prenatal portion of the dentin and enamel in erupted deciduous teeth hypoplastic?
   It may be concluded that the prenatally formed portion of the dentin and enamel in erupted deciduous teeth ordinarily is not hypoplastic.[87]

II. The minerals (calcium and phosphorus)

1. Does their ingestion improve tooth formation?
   There is sufficient evidence in the literature to justify the view that the ingestion of calcium and phosphorus in amounts sufficient to prevent skeletal defects will be adequate for the formation of teeth with normal composition and structure in the average well child. It is possible that certain persons, because of illness or metabolic abnormalities, will require an intake of calcium and phosphorus greater than that needed by the

78. *Accepted Dental Remedies.* Chicago: American Dental Association, 1946.
79. Mellanby, May, *Diet and the Teeth, An Experimental Study.* London: His Majesty's Stationery Office, 1929-1934.
80. Day, C. D. M., Nutritional Deficiencies and Dental Caries in Northern India. *Brit. D. J.* 76:115 (March 3); 143 (March 17) 1944.
81. Skatvedt, M., A Case of D Vitamin Intoxication. *Ann. Pediat.* 168:148 (March) 1947.
82. McBeath, E. C., and Verlin, W. A., Further Studies on the Role of Vitamin D in the Nutritional Control of Dental Caries in Children. *J.A.D.A.* 29: 1303 (August) 1942.
83. Jundell, I.; Hanson, R., and Sandberg, T., Stoffwechsel im Zahnschmelz und Prophylaxe Gegen Zahncaries. *Acta paediat.* 23:141, 1938.
84. Mills, C. A., Factors Affecting the Incidence of Dental Caries in Population Groups. *J. D. Res.* 16: 417 (October) 1937.
85. East, B. R., Mean Annual Hours of Sunshine and Incidence of Dental Caries. *Am. J. Pub. Health* 29:777 (July) 1939.
86. East, B. R., Relation of Dental Caries in City Children to Sex, Age and Environment. *Am. J. Dis. Child.* 61:494 (March) 1941.
87. Schour, Isaac, and Poncher, H. G., Rate of Apposition of Enamel and Dentin Measured by Effect of Acute Fluorosis. *Am. J. Dis. Child.* 54:757 (October) 1937.

usual child in order to prevent abnormalities of structure, growth and composition of the skeleton and teeth. It appears, however, that forming bone always is more sensitive to deprivation of calcium and phosphorus than are developing teeth.[88, 89]

2. Does their ingestion after the eruption of teeth reduce the caries attack rate?
   There is no conclusive evidence in the literature that the caries attack rate for fully formed erupted teeth is affected by the addition of calcium and phosphorus even to a low-normal diet.[90, 91]
3. Are structurally normal teeth less susceptible to caries than hypoplastic teeth?
   The evidence regarding the relative susceptibility to caries of hypoplastic and structurally normal teeth has not passed beyond the controversial stage. Analyses of the enamel of sound teeth and the sound enamel of carious teeth showed no differences of composition with regard to calcium, phosphorus, magnesium and carbonates.[79, 80, 92]
4. Is there any necessity for a normal child to ingest mineral calcium in addition to his daily quart of milk?
   There is no evidence to indicate that normal children require more calcium than is supplied by a diet adequate to meet total nutritional requirements; such a diet will contain approximately a quart of milk a day.[91]
5. Is there any reason for a normal pregnant woman to do so?
   There is no evidence to indicate that well nourished pregnant women require more calcium than is supplied by a diet adequate to meet total nutritional requirements.
6. Is the organic calcium of milk absorbed more easily than the inorganic calcium salts from tablets?
   There is ample evidence to support the conclusion that calcium of milk is better absorbed than calcium present in any other form.
7. Does the calcium-phosphorus ratio in saliva or blood affect the caries attack rate?
   There is ample evidence to support the view that the content of calcium or phosphorus in blood or saliva or the calcium-phosphorus ratio in either of these fluids has no correlation with the caries attack rate in the human being.[93]
8. Do the teeth of children born to mothers with osteomalacia exhibit a high degree of hypoplasia and caries?
   Day,[80] in a study of the incidence of dental caries in children born of women with severe osteomalacia in Northern India, reported that only two of 144 teeth in 7 children with severe rickets were carious.

88. Gaunt, W. E., and Irving, J. T., Influence of Dietary Calcium and Phosphorus Upon Tooth Formation. *J. Physiol.* 99:18 (December 20) 1940.
89. Schour, Isaac, Calcium Metabolism and Teeth. *J.A.M.A.* 110:870 (March 19) 1938.
90. Malan, A. L., and Ockerse, T., The Effect of the Calcium and Phosphorus Intake of School Children Upon Dental Caries, Body Weights and Heights. *S. African D. J.* 15:153 (June) 1941.
91. Lund, A. P., and Armstrong, W. D., The Effect of a Low Calcium and Vitamin D Free Diet on the Skeleton and Teeth of Adult Rats. *J. D. Res.* 21:513 (December) 1942.
92. Armstrong, W. D., and Brekhus, P. J., Chemical Constitution of Enamel and Dentin: Principal Components. *J. Biol. Chem.* 120:677 (September) 1937.
93. Boyd, J. D.; Drain, C. L., and Stearns, Genevieve, Metabolic Studies of Children With Dental Caries. *J. Biol. Chem.* 103:327 (December) 1933.

9. Is rickets a frequent cause of hypoplasia?
   It appears that hypoplasia of human teeth frequently is due to the ingestion of a suboptimal amount of vitamin D during tooth formation. It also appears that vitamin D deficiency is not the only cause of enamel hypoplasia. Day[79, 80] found that vitamin D deficiency during infancy and childhood does not always result in hypoplasia of the enamel.
10. During what age period is rickets commonly detected?
    Rickets usually occurs before the second year; that is, during the period of most active bone growth and development. Bony residues of the disease may continue to be present throughout the lifetime of the person. Furthermore, there is evidence, recently produced, which shows that a subclinical form of rickets may occur frequently up to 14 years of age.[94]
11. Is calcium from chocolate milk and from whole milk equally assimilable by human beings?
    There is no evidence of any difference in the human body's utilization of the calcium from chocolate milk as compared with its utilization of calcium from whole milk.
    Animal studies indicate that the rat assimilates a higher percentage of calcium from whole milk than from chocolate milk because of the oxalic acid (0.5 to 0.6 per cent) in cocoa, but the oxalic acid content is not sufficient to disturb the assimilation of calcium by human bodies.[95]

Respectfully submitted: Philip E. Blackerby, Jr., D.D.S., chairman; Hugh M. Tarpley, D.D.S., secretary; Stanley C. Brown, D.D.S., Albert E. Bucholz, D.D.S., Gerard J. Casey, D.D.S., Sarah E. Hill, B.A., Irvin W. Leichtfuss, D.D.S., and William H. Rumbel, D.D.S.; Wallace D. Armstrong, Ph.D., and Adelia M. Beeuwkes, M.S., consultants.

Note: After a period of discussion in which no changes in the statement were made, adoption of the report was moved by Dr. Teuscher, seconded by Dr. Owen and approved unanimously.

94. Eliot, Martha M., and Park, E. A., Rickets, in *Brennemann's Practice of Pediatrics*. Hagerstown, Md.: W. F. Prior Company, 1945.

95. Mitchell, H. H., and Smith, J. M., Effect of Cocoa on Utilization of Dietary Calcium. *J.A.M.A.* 129:871 (November 24) 1925.

VARIOUS TYPES OF DIETS

Committee VI was assigned the subject "The Contribution of the Type of Diet to Caries Control," with three subheadings: (1) adequacy of the diet, (2) consistency of the diet and (3) carbohydrate restriction.

Members of the committee sought information on the following two points: 1. Has the diet of the people in the United States improved since 1900? 2. Has the dental caries attack rate increased since 1900?

Dietary Since 1900

The per capita food supplies in this country are bountiful compared with those of most other parts of the world. The per capita volume has remained fairly constant during the last three decades, but within the total, the relative importance of various foods has been shifted. There has been a phenomenal rise in the consumption of sugar and citrus fruits, and an upward trend in the consumption of dairy products. From the standpoint of nutrition, certain of these trends in food consumption

have enriched the diets of the American people while others have impoverished them. On the credit side, for example, is the increase in consumption of dairy products, fruits and succulent vegetables; on the debit side, the increase in consumption of refined sugar.[96]

Dental Caries Attack Rate

Reliable evidence regarding an increase in the dental caries attack rate is meager. If the two studies available to the committee are indicative of national trends,[97, 98] it may be assumed that the dental caries attack rate has increased.

Adequacy of Diet

Although the committee found no conclusive evidence that an adequate, optimal or balanced diet as outlined by the Food and Nutrition Board, National Research Council, would influence the caries attack rate, it is imperative that a diet conducive to individual health be advocated.

The committee uncovered no substantial evidence that fibrous foods, uncooked fruits or vegetables or so-called detergent foods reduce the caries attack rate.

Carbohydrate Restriction

Studies by a number of investigators indicate that the restriction of sugar, either refined or natural, is effective in the control of dental caries.[99-110] Moreover, the restriction of sugar, either refined or natural, will improve the dietary, provided the caloric intake remains adequate.[111] The harmful effects of sugar, refined or natural, are not reduced by the addition of either vitamins or minerals.

Respectfully submitted: J. M. Wisan, D.D.S., chairman; W. F. Hoffman, D.D.S., secretary; Gladys Eyrich, B. F. Gunter, D.D.S., J. C. Livett, D.D.S., B. M. Medof, D.D.S., Elsie Schildwachter, D.D.S., Feno Shafer, D.D.S., and Walter D. Thomas, D.D.S.; Hermann Becks, M.D., D.D.S., Philip Jay, D.D.S., and Genevieve Stearns, Ph.D., consultants.

Note: The discussion resulted in no change in the original statement. The adoption of the report was moved by Dr. Teuscher, seconded by Dr. Chrietzberg and then approved unanimously.

96. Stiebeling, Hazel K., Adequacy of American Diets, in Council on Foods and Nutrition, American Medical Association, *Handbook of Nutrition*. Chicago: American Medical Association, 1943.

97. Brekhus, P. J., *Your Teeth, Their Past, Present and Probable Future*. Minneapolis: University of Minnesota Press, 1941.

98. Wisan, J. M., and Chilton, N. W., Studies in Dental Public Health Administration: IV. Dental Caries Experience of New Jersey School Children. *J.A.D.A.* In press.

99. Anderson, T. G., and Rettger, L. F., Acidogenic and Aciduric Bacteria of the Mouth and Their Possible Relation to Dental Caries. *J. D. Res.* 16:489 (December) 1937.

100. Becks, H., Human Saliva. XIV. Total Calcium Content of Resting Saliva of 650 Healthy Individuals. *J. D. Res.* 22:397 (October) 1943.

101. Becks, Hermann; Jensen, A. L., and Millarr, C. B., Rampant Dental Caries: Prevention and Prognosis. A Five Year Clinical Survey. Abstract. *J. D. Res.* 23:210 (June) 1944.

102. Bibby, B. G.; Volker, J. F., and Van Kesteran, Mary, Acid Production and Tooth Decalcification by Oral Bacteria. *J. D. Res.* 21:61 (February) 1942.

103. Boyd, J. D., Nutrition as It Affects Tooth Decay. *J. Am. Dietet. A.* 18:211 (April) 1942.

104. Bunting, R. W., Studies of the Relation of Bacillus Acidophilus to Dental Caries. Abstract. *J. D. Res.* 8:222 (April) 1928.

105. Fosdick, L. S., Carbohydrate Degradation by Mouth Organisms. I. *J.A.D.A.* 26:415 (March) 1939.

106. Fosdick, L. S., and Starke, A. C., Jr., Carbohydrate Degradation by Mouth Organisms. III. L. Acidophilus. *J.A.D.A.* 28:234 (February) 1941.

107. Jay, Philip, The Role of Sugar in the Etiology of Caries. *J.A.D.A.* 27:393 (March) 1940.

108. Jay, Philip, and Esser, Ann, Further Studies on the Etiology and Control of Dental Caries. *J.A.D.A.* 17:1117 (June) 1930.

109. Miller, S. C., and Neuwirth, Isaac, Tooth Decalcification Due to Hard Candies. *D. Cosmos* 77:453 (May) 1935.

110. Schoenthal, L., and Brodsky, R. H., Dietary Control and Etiology of Dental Caries. *Am. J. Dis. Child.* 46:91 (July) 1933.

111. This opinion was endorsed by the following committee consultants: Genevieve Stearns, Iowa City, research professor in pediatrics, department of pediatrics, University of Iowa Hospitals; Hermann Becks, San Francisco, professor of dental medicine, School of Dentistry, University of California; Philip Jay, Ann Arbor, associate professor of dentistry, School of Dentistry, University of Michigan.

THE EFFECT OF GUM CHEWING ON THE TEETH AND SUPPORTING STRUCTURES

J. F. Volker, D.D.S., Boston

ALTHOUGH the chewing of gum is an extremely common habit, the effect of this procedure on the teeth and their supporting structures has not been satisfactorily investigated. Kells[1] has stated that the practice may be advantageous, and the research of Knighton[2] and of Turesky and Bibby[3] indicates that the chewing of gum tends to cleanse the oral cavity mechanically. However, a dissenting view has been advanced by Fleisch[4] and has found support in the report of Rothenberg[5] that the chewing of gum has harmful consequences, at least in so far as it tends to increase susceptibility to dental caries.

Since there is a need for further research on the subject, a clinical and laboratory investigation was designed to test the effect of gum chewing on the incidence of dental caries. Likewise, since it seemed opportune, preliminary observations as to the effect of gum chewing on the gingivae, calculus formation and biting pressure were included as a part of the study.

Methods

The persons utilized in this study were students and young employees at Tufts College Dental School. The decision to use these people was based on the experience that groups of this sort are more cooperative than others in maintaining experimental regimens and on the fact that the available information supports the belief that young adults are the heaviest consumers of gum.

At the onset of the investigation the experimental subjects were divided into two comparable groups. The division was made on the basis of such variable factors as age, past caries experience (full mouth and bitewing roentgenograms and detailed clinical examination), present susceptibility to caries (lactobacilli counts[6] and Snyder[7] tests), formation of calculus[8] (recorded as being absent, slight, moderate or excessive), degree of gingival inflammation[9] (recorded as being absent, slight, moderate or excessive), biting

From the Department of Preventive Dentistry, Tufts College Dental School.

This work was supported by a grant from the American Chicle Company, New York.

1. Kells, C. E., *The Dentist's Own Book*. St. Louis: C. V. Mosby Co., 1925, p. 470.

2. Knighton, H. T., Effect of Various Foods and Cleansing Agents on the Elimination of Artificially Inoculated Yeast from the Mouth. *J.A.D.A.* 29:2012 (November 1) 1942.

3. Turesky, S. S., and Bibby, B. G., Some Observations on the Elimination of Yeast from the Mouth. *J. D. Res.* 23:51 (February) 1944.

4. Fleisch, L. M., Is Chewing Gum a Safe Dental Therapeutic Agent? *J.A.D.A.* 29:1011 (June) 1942.

5. Rothenberg, M. S., Cervical Caries in Gum Chewers. *D. Students' Mag.* 22:18 (October) 1943.

6. Hadley, Faith P., A Quantitative Method for Estimating Bacillus Acidophilus in Saliva. *J. D. Res.* 13:413 (October) 1933.

7. Snyder, M. L., A Simple Colorimetric Method for the Estimation of Relative Numbers of Lactobacilli in the Saliva. *J. D. Res.* 19:349 (August) 1940.

8. The formation of calculus was recorded as slight in those cases in which the tartar was deposited only in small quantities on the lingual aspect of the lower incisors. It was recorded as moderate in those cases in which it was present in sufficient amounts to obscure partially the interproximal lingual outline of the lower anterior teeth. Slight deposits on the buccal surfaces of the upper molars were a consistent finding. Calculus formation that was recorded as excessive tended to obliterate the interproximal and lingual outline of the lower anterior teeth. Appreciable deposits also were present on the buccal aspect of the upper molars, and scattered accumulations could be noted on other portions.

9. Gingival inflammation was recorded as slight when there was some pallor of the marginal gingivae with a tendency to slight bleeding on examination with a probe. It was considered as moderate when the interproximal papillae were somewhat edematous and when a loss of velvety stippled appearance was evident. Instrumentation resulted in moderate to heavy bleeding. Gingival inflammation was recorded as excessive when the gingivae were enlarged and were of an abnormally deep red color. Pocket formation and crevicular exudate often were present.

pressure (as registered by the gnathodynamometer of Brawley)[10] and past history of gum chewing (considered as negative, occasional or habitual).

The method of clinical examination was sufficiently detailed so as to permit the caries to be reported as D.M.F. (decayed, missing and filled) teeth and D.M.F. surfaces. In an effort to assist the visual impression of the presence of gingival inflammation and calculus formation, Kodachrome pictures were taken in the more advanced cases and preserved for comparison with terminal pictures.

Fifty persons were included in the experimental group, and a similar number served as controls. The ages of the persons in the experimental group ranged from 18 to 32 years with an average age of 22.1 years; the ages of the persons in the control group ranged from 18 to 32 years with an average age of 21.5 years.

Gum supplements (Dentyne)[11] were distributed at weekly intervals to the persons in the experimental group. They were instructed to chew two sections for a minimum of ten minutes after the morning and evening meals. The persons in the control group were asked to refrain from all gum chewing. I was unwittingly assisted by the wartime emergency that made independent purchase of gum an improbability.

At the end of the ninth month when the groups reported for an intermediate examination, it became evident that because of the war program of accelerated study and its attendant hardships an unexpectedly large decrease had occurred in the number of test subjects. To compensate for this loss, twenty-four new persons divided equally between the control and experimental groups were added. All of these persons had been evaluated by the methods previously described.

At the end of eighteen months the projects were terminated, and the original examination and tests, except for lactobacilli counts, were repeated. All of the clinical examinations were made by one person who was not informed as to the identity of the groups. In my opinion, the cooperation of the experimental subjects was of an extremely high order, and in so far as this factor may influence the results the conclusions are valid.

After the clinical study was under way, it was decided that an attempt should be made to measure the reduction in salivary debris produced by chewing gum. The method that was evolved as the result of considerable preliminary testing utilized a graham cracker[12] spread with a tablespoon of peanut butter. After the person to be tested had rinsed his mouth thoroughly, he was given the spread cracker and advised to eat it at a normal rate.

Ten minutes later, during which time there was no unusual effort to remove food adhering to the teeth, five successive samples of unstimulated saliva (1 cc. each) were collected in a graduated 15 ml. centrifuge tube. The mouth was thoroughly rinsed twice with 5 cc. of water, and the rinsings were added to the saliva samples.

After a rest of fifteen minutes the same procedure was repeated except that from five minutes after the ingestion of the cracker until the time of collection of the saliva two sections of gum (weight 3.2 gm.) were chewed. In certain instances the procedure was reversed, the gum chewing exercise preceding the control measurement.

Both tubes were centrifuged at medium speed (International Clinical Model) for ten minutes, and the contents of the tubes were compared. The percentage of reduction in the volume of salivary debris was taken as a measure of the de-

10. Brawley, R. E., and Sedwick, H. J., Gnathodynamometer. *Am. J. Orthodont. & Oral Surg.* 24:256 (March) 1938.

11. Dentyne is composed of gum base, sugar, dextrose, corn syrup, softeners, food color and natural and artificial flavoring.

12. The cracker was composed of flour, graham flour, sugar, shortening, molasses, salt and leavening. Its weight was 8.7 grams.

tergent efficiency of the chewing gum.

The following is an outline of the procedure for testing the reduction in salivary debris:

A. Control determination
   1. Chew spread cracker at normal rate.
   2. Ten minutes later expectorate five successive samples of salivary debris.
   3. Rinse mouth twice with 5 cc. of water.
   4. Pool saliva and debris and washings in 15 ml. tube.
   5. Centrifuge tube at medium speed for ten minutes.
   6. Record volume of debris.
   7. Permit fifteen minutes to elapse.

B. Experimental determination
   1. Chew spread cracker at normal rate.
   2. Five minutes later start to chew two sections of gum.
   3. Ten minutes after the beginning of ingestion of the cracker, discard gum and expectorate five successive samples of saliva and debris.
   4. Rinse mouth twice with 5 cc. of water.
   5. Pool saliva and debris and washings in 15 ml. tube.
   6. Centrifuge tube at medium speed for fifteen minutes.
   7. Record volume of debris.

C. Calculation of reduction in salivary debris

   Compare result recorded in step 6 of control determination with result of step 7 of experimental determination. Detergent efficiency is expressed by the percentage reduction in volume of salivary debris.

Results

Caries.—The influence of the chewing of gum on dental caries is shown in Table 1. All figures are average percentages. It seems obvious that under the conditions of this experiment gum chewing is without effect on the incidence of dental caries. The average increase in the number of D.M.F. teeth and D.M.F. surfaces is essentially the same in the nonchewing and chewing groups. A consideration of the number of new carious regions that appeared during the experimental period also supports this belief. The latter score, in addition to noting new caries in surfaces formerly intact, includes a measure of caries recurrence in previously filled surfaces. Similarly the D.M.F. rate was not related to the gum chewing habits at the time of the original examination, the average of the nonchewing, occasional and habitual chewing groups being 13.7, 13.8 and 12.2. No information is available as to the duration of gum chewing practices prior to the questioning.

The conclusion that gum chewing is without effect on the incidence of dental caries also is supported by the results of

Table 1.—Effect of Dentyne gum on caries experience

Group	Subjects	D.M.F.*			D.M.F.†			New carious regions‡
		Initial	Final	Increase	Initial	Final	Increase	
Nonchewers								
1	36	13.4	15.4	2.0	28.5	38.3	9.8	10.6
2	11	12.6	16.0	3.4	26.2	34.4	8.2	9.7
Chewers								
1	40	13.2	16.0	2.8	28.5	37.7	9.2	10.3
2	12	13.3	15.6	2.3	26.8	35.8	9.0	9.3

*D.M.F., decayed, missing and filled teeth expressed in percentages.
†D.M.F., decayed, missing and filled surfaces in percentages.
‡New carious regions in percentages (number of carious lesions appearing on noncarious surfaces plus those recurring on previously filled surfaces).

Table 2.—Caries susceptibility as indicated by Snyder test

Examination	Subjects	0-1	2	3-4
First	Chewers	11	4	24
	Nonchewers	11	5	20
Second	Chewers	14	5	18
	Nonchewers	7	6	23
Third	Chewers	12	2	24
	Nonchewers	7	3	23
Fourth	Chewers	11	6	22
	Nonchewers	7	5	23

0-1 indicates limited susceptibility.
2 indicates susceptibility.
3-4 indicates marked susceptibility.

the Snyder test for susceptibility to caries, as shown in Table 2. In addition to the initial and terminal tests, members of the original groups had two intermediate tests. In general those persons who were highly susceptible to dental caries remained susceptible regardless of whether they did or did not chew gum. Similarly, those who enjoyed a limited susceptibility were unaffected by chewing gum.

Gingival Inflammation and Calculus Formation.—Table 3 shows the effect of gum chewing on gingival inflammation and calculus formation. It would seem that moderate gum chewing does not influence gingival inflammation or calculus formation in either a favorable or unfavorable manner. A comparison of the initial and terminal Kodachrome pictures supports this belief.

Biting Pressure.—The average initial bite pressure of the chewing and nonchewing groups was 139.4 and 132.0 pounds, respectively. At the end of the experiment this had risen to 145.3 pounds in the former and 136.5 in the latter group. This is a gain of 5.9 in the chewing group and 4.5 in the nonchewing group. It is evident that since the increase in bite pressure is essentially the same in both groups, the experimental conditions had no influence.

Salivary Debris.—The reduction in salivary debris can be measured by comparing the volume of debris that remains a given time after the ingestion of a test meal with the reduced quantity of debris present after gum chewing. By use of the technic previously described, the average reduction in salivary debris as measured in 30 persons was 82 per cent. The distribution was as follows: 17 persons 90 to 100 per cent, 5 persons 80 to 90 per cent, 3 persons 70 to 80 per cent, 5 persons 44 to 70 per cent. The daily reduction in salivary debris for 3 subjects over a five day period was 45, 80, 75, 65 and 90 per cent for the first person; 65, 90, 90, 90 and 90 per cent for the second, and 50, 85, 90, 95 and 65 per cent for the third.

Discussion

The inability of gum chewing to influence the susceptibility to caries under the conditions of this experiment is not surprising. Although chewing gum contains, in addition to sucrose, appreciable amounts of glucose, it has been established that after introduction in this form the clearance of these materials from the mouth is most rapid when compared with glucose ingested in other common

Table 3.—Effect of gum chewing

Gingival inflammation

Chewers (51 persons)		Nonchewers (47 persons)
Increase	18	20
Decrease	2	2
No change	31	25

Formation of calculus

Chewers (50 persons)		Nonchewers (47 persons)
Increase	12	9
Decrease	18	23
No change	20	15

confections and foodstuffs.[13] It follows that if the level of glucose in the saliva is of importance in the causation of caries, gum chewing would have a minimal detrimental effect. Likewise, on the basis of the detergency observations in this study, it seems probable that the chewing of gum would tend mechanically to remove residual foodstuffs that might be concerned with the production of caries.

The failure of gum chewing to influence the degree of gingival inflammation, calculus formation and bite pressure is contrary to widely accepted beliefs. It is possible that the findings with reference to the gingivae and the formation of calculus may be related to the type of person participating in the study. Our subjects showed a high level of oral hygiene, and it seems probable that tooth brushing and gum massage tend to limit gingival inflammation and calculus formation. The correctness of this hypothesis might be tested by placing persons with poor mouth hygiene and excessive calculus formation and gingival inflammation on gum chewing regimens.

It is interesting to compare the increase in biting pressure of approximately 5 pounds in both groups in a period of eighteen months with the observation of Brawley and Sedwick[14] that from the age of 11 to 17 years there is an average yearly increase of biting pressure of 5 pounds. It should be noted that Brekhus and co-workers[15] have reported that the chewing of paraffin one hour each day increased the average biting pressure of a group of young men from 118 pounds to 142 pounds in fifty days.

13. Volker, J. F., and Pinkerton, D. M., Factors Influencing Oral Glucose Clearance. *J. D. Res.* 26:225 (June) 1947.

14. Brawley, R. E., and Sedwick, H. J., Studies Concerning the Oral Cavity and Saliva. *Am. J. Orthodont. & Oral Surg.* 26:41 (January) 1940.

15. Brekhus, P. J.; Armstrong, W. D., and Simon, W. J., Stimulation of the Muscles of Mastication. *J. D. Res.* 20:87 (April) 1941.

Summary

The effect of chewing gum was studied under carefully controlled conditions. It was found that gum chewing did not increase dental caries nor did it influence gingival inflammation or the formation of calculus under the conditions of this experiment. In this experiment the chewing of gum was without effect on biting pressure. By use of a simplified method of control, the chewing of gum was shown to remove on an average 80 per cent of residual oral debris.

Correlation Between Intelligence Quotient and Size of Family.—In a survey of the results of intelligence tests in a group of nearly 3,000 school children, Thompson and Sutherland found that there was a negative correlation ($r = -0.25$) between intelligence quotient and size of family. This means that, in 60 per cent of the families studied, smallness of family was associated with mental ability above the average. There is a consistent trend from the 66 per cent above-average intellects in only children to the 39 per cent above-average intelligence-test results in families of over seven. That this was not wholly due to differences in home environment was shown by subsequent demonstration of a similar association in the children of miners on the same social level. . . . This earlier work was strikingly confirmed by a very comprehensive study, by Fraser Roberts and his associates, of intelligence among an entire age-group of the children of Bath. They, too, showed this definite negative association between the children's intelligence quotient and the size of the family to which they belonged.—*"Breeding Out Intelligence," Lancet 2:205, August 10, 1946.*

FLUORINE IN DRINKING WATER: ITS EFFECT ON DENTAL CARIES

Francis A. Arnold, Jr., D.D.S., Bethesda, Md.

DURING the last decade dentistry has been presented with evidence suggesting a practical method for partially controlling dental caries in large population groups; that is, by means of fluorination of domestic water supplies. Such a suggestion originated principally from studies of the effects of fluoride-bearing waters on the prevalence of caries. In view of the fact that hitherto no effective means of mass control of this disease has been known, both the dental profession and the laity are extremely interested in the evidence presented. Often the hopes and expectations of both groups go beyond logical interpretation of the scientific evidence.

It is the purpose of this paper to review briefly some of the major points of evidence reported to date, with special reference to the epidemiologic studies of water-borne fluorides. A more complete review of the dental caries-fluorine relationship can be found in the recent publication of the American Association for the Advancement of Science.[1]

Prior to 1938, most dental research in regard to water-borne fluorides centered on the problem of dental fluorosis. Today the cause of this disease and the methods of its prevention are known. Of special importance in the dental caries-fluorine phenomenon is the fact that the concentrations of fluorides that produce fluorosis also are known. Aside from the establishment of these basic facts, additional knowledge has been obtained. As stated by Dean,[2] "Studies in endemic dental fluorosis provided the proving ground whence evolved many of the ideas and methodologies later utilized in the studies designed to outline the epidemiological characteristics of the fluorine-dental caries relationships."

Before the etiologic agent of dental fluorosis, fluorine, was known and prior to the first report of low caries rates in endemic areas of dental fluorosis, mention was made of the fact that caries was no more prevalent, and probably less so, in persons who exhibited evidence of fluorosis.[3-5] Special interest of dental research workers was focused on the caries-fluorine relationship a decade ago after fluorine was recognized to be the cause of mottled enamel and the earlier observations were supported by the results of both laboratory and epidemiologic studies.

Epidemiologic Studies

After Dean[6] had reported concerning the lowered dental caries rates in areas of endemic dental fluorosis in South Da-

From Dental Research Section, Division of Physiology, National Institute of Health, Bethesda, Md.

Read at the eighty-eighth annual session of the American Dental Association, Boston, August 6, 1947.

Dental Surgeon, U. S. Public Health Service.

1. *Dental Caries and Fluorine*. Washington, D. C.: American Association for the Advancement of Science, 1946.

2. Dean, H. T., Some General Epidemiological Considerations, in *Dental Caries and Fluorine*,[1] pp. 1-4.

3. McKay, F. S., Mottled Enamel: A Fundamental Problem in Dentistry. *D. Cosmos* 67:847 (September) 1925.

4. Bunting, R. W., and others, Further Studies of the Relationship of Bacillus Acidophilus to Dental Caries (III). *D. Cosmos* 70:1002 (October) 1928.

5. McKay, F. S., The Establishment of a Definite Relation Between Enamel That Is Defective in Its Structure, as Mottled Enamel, and the Liability to Decay (II). *D. Cosmos* 71:747 (August) 1929.

6. Dean, H. T., Endemic Fluorosis and Its Relation to Dental Caries. *Pub. Health Rep.* 53:1443 (August 19) 1938.

kota, specific epidemiologic studies were inaugurated to gain further knowledge of this phenomenon. These studies were designed to check by detailed local investigations the relation between fluorosis and caries.

The observations were limited to specific groups according to age and sex. White school children, aged 12 to 14 years, were selected. Since it was logical to assume that this phenomenon might be related to differences in domestic water supplies, only children who used continuously one common water supply were included. The cities selected for study had domestic water supplies which met the necessary prerequisite as to fluoride content and had made no changes in their water supplies for a period greater than the age of the children studied. Factors such as dietary habits (especially carbohydrate intake), latitude and sunlight were taken into account in so far as possible. Complete details of the epidemiologic technics employed in the selection of children and areas of study have been presented by Dean.[7]

The first of these investigations was made in four cities in north central Illinois.[8] Two of these cities, Galesburg and Monmouth, had communal water supplies which contained 1.8 and 1.7 parts of fluoride per million, respectively. Quincy and Macomb, the control cities, used domestic water supplies which were fluoride-free; that is, they contained less than 0.2 p.p.m. of fluoride.

The prevalence of dental caries in the children of these four communities differed greatly. For example, the average 13 year old child in Galesburg had experienced caries in only about two permanent teeth, but in Quincy the average 13 year old child had about six teeth showing caries experience. It also was noted that in Galesburg and Monmouth approximately 36 per cent of the children were caries-free as compared with 14 per cent in Macomb and 4 per cent in Quincy.

Other interesting findings of this study were the differences in the distribution of high and low Lactobacillus acidophilus counts, the striking differences in proximal and smooth surface caries and the relation between macroscopic fluorosis and dental caries. In the case of the last, it was observed that the lowered caries rates in Galesburg children were not associated with the presence of dental fluorosis by itself. This finding confirmed the earlier observations by Dean.[6]

The evidence from this study together with other information available at that time pointed to water supplies and presumptively to the fluoride content of those water supplies as the primary associated factor. This raised the question of whether a decreased prevalence of dental caries is associated with the use of water supplies whose fluoride content is less than the concentration necessary to produce any significant amount of dental fluorosis.

In order to answer this question a detailed study was made of school children in eight suburban Chicago communities. The communities and the children were selected in the manner previously described.[9] The results of this study confirmed the findings at Galesburg and Quincy in regard to the marked differences in the prevalence of dental caries between children using fluoride waters as compared with children using fluoride-free water.

As shown in Table 1, the caries experience rates in Elmhurst, Maywood, Aurora and Joliet, whose public water supplies contain 1.8, 1.2, 1.2 and 1.3 p.p.m.

7. Dean, H. T., Epidemiological Studies in the United States, in *Dental Caries and Fluorine*,[1] pp. 5-31.

8. Dean, H. T., and others, Domestic Water and Dental Caries, Including Certain Epidemiological Aspects of Oral *Lactobacillus Acidophilus*. *Pub. Health Rep.* 54:862 (May 26) 1939.

9. Dean, H. T., and others, Domestic Water and Dental Caries. II. A Study of 2,832 White Children, Aged 12-14 Years, of 8 Suburban Chicago Communities, Including *Lactobacillus Acidophilus* Studies of 1,761 Children. *Pub. Health Rep.* 56:761 (April 11) 1941.

of fluoride, respectively, were 252, 258, 281 and 323, respectively. The children of Evanston, Oak Park and Waukegan, using fluoride-free water, showed caries experience rates of 673, 722 and 810, respectively. The results of the examinations at Elgin, where the public water supply contains about 0.5 p.p.m. of fluoride, indicate a caries experience rate (444) that is about midway between that of the fluoride and fluoride-free areas.

The observations in this study were suggestive of an inverse variation of dental caries and the fluoride concentration of the domestic water. It also was noted that the inhibitory factor, presumably fluorine, was operative at concentrations below what is now the accepted permissible standard for water, 1.5 p.p.m.[10] At these low concentrations dental fluorosis is no problem. Evidence of this fact was obtained in Aurora where although 15 per cent of the children were classed as having fluorosis, only 5 per cent of all the teeth and only about 0.4 per cent of the anterior teeth showed even so much as the mildest forms of fluorosis. This minor amount of affection, which is noticeable only to a trained observer, is of no esthetic or public health significance.

As may be noted in Table 1, there were differences other than the fluoride content in the water supplies of the communities studied. For example, the cities in which the caries rates were low used well waters while those with high caries prevalence rates used surface (Lake Michigan) water. Thus, comparisons were made on water supplies of varying mineral content. In order to check this variable and to confirm the observation regarding the effect of the lower ranges of fluoride concentrations (1 p.p.m. and less), epidemiologic studies in other communities were conducted. By the use of similar technics of examination and the same criteria of selection, children 12 to 14 years of age in nineteen additional communities were studied.

The communities selected had water supplies which varied from a high fluoride content with a low mineral content to fluoride-free waters with a high mineral content. The sources of these water supplies were deep wells, lakes and rivers, and cisterns. Including the children in the eight Chicago suburbs, a total of 8,576 children in twenty-seven cities of eight states have been studied. The results of these examinations are shown in the illustration and in Table 2. More complete details concerning these study areas were presented by Dean, Arnold and Elvove.[11]

The data suggest the following conclusions: First, children who are born and reared in communities whose domestic water supplies contain increased amounts of fluorine (more than 0.5 p.p.m.) experience less dental caries than do children living in areas where the domestic water supply is fluoride-free (Tables 1 and 2). Second, this phenomenon is operative whether or not the teeth show macroscopic evidence of fluorosis. Third, the decreased prevalence of dental caries is evident in areas where the fluoride content of the water is below those levels which produce dental fluorosis of any esthetic significance.

A careful analysis of the data strongly suggests fluorine as the active inhibitory factor present in these water supplies.

As stated previously, factors other than those present in the water supplies which probably could have influenced the dental caries experience were taken into account and in so far as possible were equalized by careful selection of the study areas. As for the variability in water supplies, one characteristic other than fluoride which has been suggested as low-

10. Public Health Service Drinking Water Standards, 1946. *Pub. Health Rep.* 61:371 (March 15) 1946.

11. Dean, H. T.; Arnold, F. A., Jr., and Elvove, Elias, Domestic Water and Dental Caries. V. Additional Studies of the Relation of Fluoride Domestic Waters to Dental Caries Experience in 4,425 White Children, Aged 12 to 14 years, of 13 Cities in 4 States. *Pub. Health Rep.* 57:1155 (August 7) 1942.

ering dental caries experience is the total hardness of the water. In the study of the twenty-seven cities, however, there is little evidence of correlation between the total hardness of the water and caries prevalence (Table 2). For example, Middletown and Zanesville, Ohio, and Elkhart, Ind., have waters of relatively high total hardness (329, 291 and 220 p.p.m, respectively) and show caries experience rates of 703, 733 and 823, respectively. On the other hand, Colorado Springs, Colo. and Maywood, Ill., using waters of much lower total hardness (27 and 75 p.p.m., respectively) had lower caries rates (246 and 258, respectively). The one variable, however, which does correlate with caries prevalence is the fluoride

Table 1.—Summary of dental caries findings in 2,832 selected white children, aged 12 to 14 years, in eight suburban Chicago communities in relation to the fluoride content of the public water supply[9]

	City or village	Elmhurst	Maywood	Aurora	Joliet	Elgin	Evanston	Oak Park	Waukegan
Sampling	Total number of 12-14 year old children present at time of sampling	633	873	1,625	1,412	1,030	2,125	1,662	1,354
	Number of 12-14 year old white children whose histories on repeated questioning indicated continuity of exposure and who were examined	170	171	633	447	403	256	329	423
	Percentage of the total present who were examined	26.9	19.6	39.0	31.7	39.1	12.0	19.8	31.2
Water supply	Source	Deep wells					Lake Michigan		
	Permanent hardness in parts per million	323.4	75.0	328.5	349.3	102.6	131.0	132.2	134.4
	Mean fluoride (F) content, 1939-1940, in parts per million	1.8	1.2*	1.2	1.3	0.5	0.0	0.0	0.0
Clinical examination	Dental caries experience, permanent teeth, per 100 children examined	252	258	281	323	444	673	722	810
	Dental caries experience, proximal surfaces, superior incisors, per 100 surfaces	0.60	0.59	0.78	1.3	4.1	10.7	9.0	17.7
	First permanent molar mortality, per 100 children examined	11.8	11.7	14.5	19.5	20.3	42.6	31.0	79.9
	Percentage of children with no dental caries experience	25.3	29.8	23.5	18.3	11.4	3.9	4.3	3.1
	Percentage incidence of endemic dental fluorosis (mottled enamel)	40.0	33.3	15.0	25.3	4.2	1.6	0.6	0.2
Bacteriology	Percentage of those examined bacteriologically whose salivary L. acidophilus counts were: Negative and < 100	35.7	39.6	38.2	35.6	21.2	15.4	18.2	14.9
	30,000 and >	24.7	20.9	25.6	26.6	33.2	41.8	43.8	54.6

*There is both presumptive and direct evidence that prior to a few years ago the Maywood water contained probably 1.4-1.6 p.p.m. of fluoride (F).

content of these water supplies.

Attention is called to the possibility that other factors or combinations of factors associated with water may play a role in the carious process or in the caries-fluorine relationship. At present comparatively little information is available regarding the physiologic role of such a major part of our daily diet as our drinking water. It is known that there is a great variation at least in the chemical composition of the different waters; further study may disclose physiologic effects resulting from some of these variables.

In addition to indicating that fluorine is the active inhibitory factor, the observations in the twenty-seven cities also suggest that almost full benefit is obtained if the fluoride content is only about 1 p.p.m. At this low range of fluoride concentration the dental fluorosis index is less than 0.5 (see illustration). A description of the method[12] of establishing

12. Dean, H. T., The Investigation of Physiological Effects of the Epidemiological Method, in *Fluorine and Dental Health*. Washington, D. C.: American Association for the Advancement of Science, 1942.

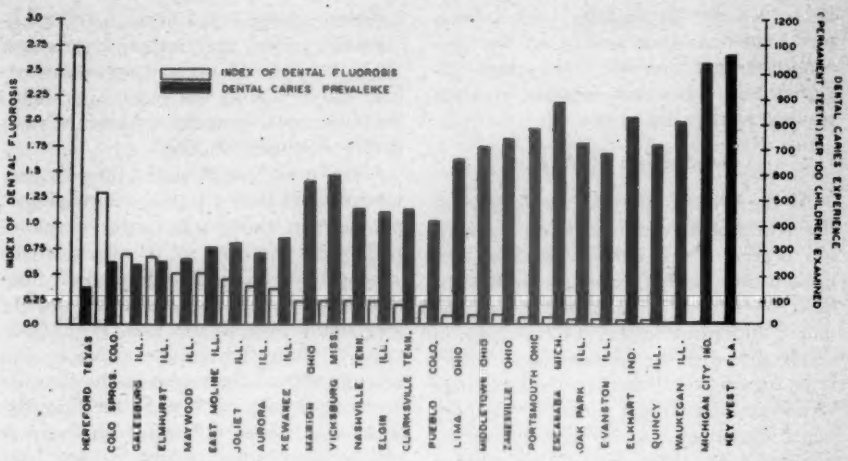
Table 2.—Summary of dental caries and fluorosis findings in 8,576 selected white school children, 12 to 14 years of age, in twenty-seven cities of eight states in relation to fluoride content, total hardness and source of domestic water supply

City	Children examined	Clinical			Water supply		
		Caries experience in permanent teeth		Per cent children with fluorosis	Fluoride, p.p.m.	Total hardness, p.p.m.*	Source
		Per cent with none	Number per 100 children				
Hereford, Texas	60	38.3	147	100.0	3.1	383	Deep wells
Colorado Sprgs, Colo.	404	28.5	246	73.8	2.6	27	Surface (Pike's Peak)
Galesburg, Ill.	273	27.8	236	47.6	1.9	247	Deep wells
Elmhurst, Ill.	170	25.3	252	40.0	1.8	323	Deep wells
Maywood, Ill.	171	29.8	258	33.3	1.2†	75	Deep wells
East Moline, Ill.	152	20.4	303	31.6	1.2†	276	Deep wells
Joliet, Ill.	447	18.3	323	25.3	1.3	349	Deep wells
Aurora, Ill.	633	23.5	281	15.0	1.2	329	Deep wells
Kewanee, Ill.	123	17.9	343	12.2	0.9	445	Deep wells
Vicksburg, Miss.	172	8.7	587	11.0	0.2	94	Yazoo and Miss. River
Nashville, Tenn.	662	9.4	461	8.6	0.0	79	Cumberland River
Clarksville, Tenn.	60	16.7	458	8.3	0.2	89	Cumberland River
Pueblo, Colo.	614	10.6	412	6.5	0.6	302	Arkansas River
Marion, Ohio	263	5.7	556	6.1	0.4	209	Deep wells
Elgin, Ill.	403	11.4	444	4.2	0.5	103	Deep wells
Lima, Ohio	454	2.2	652	2.2	0.3	223	Impounded surface
Evanston, Ill.	256	3.9	673	1.6	0.0	131	Lake Michigan
Zanesville, Ohio	459	2.6	733	1.5	0.2	291	Deep wells
Escanaba, Mich.	270	1.1	877	1.5	0.2	123	Lake Michigan
Portsmouth, Ohio	469	1.3	772	1.3	0.1	80	Ohio River
Middletown, Ohio	370	1.9	703	1.1	0.2	329	Deep and shallow wells
Oak Park, Ill.	329	4.3	722	0.6	0.0	132	Lake Michigan
Elkhart, Ind.	278	1.4	823	0.4	0.1	220	Deep wells
Quincy, Ill.	330	2.4	706	0.3	0.1	88	Mississippi River
Waukegan, Ill.	423	3.1	810	0.2	0.0	134	Lake Michigan
Michigan City, Ind.	236	0.0	1,037	0.0	0.1	141	Lake Michigan
Key West, Fla.	95	0.0	1,070	0.0	0.1‡	36‡	Cisterns

*Total hardness calculated in accordance with *Standard Methods for the Examination of Water and Sewage*. New York: American Public Health Association, 1936.

†There is both presumptive and direct evidence that these water supplies contained about 1.5 p.p.m. of fluoride prior to a few years ago.

‡Average of five water samples from cisterns considered typical of those used by most Key West inhabitants.



Relation between the amount of dental caries in the permanent teeth of 8,576 white children 12 to 14 years old in twenty-seven cities of eight states and the index of dental fluorosis

a fluorosis index has been given by Dean. The problem of dental fluorosis in these areas is negligible as indicated by the observation in Aurora, Ill., as previously described. Increasing the fluoride content much above 1 p.p.m. produces little additional inhibition of caries but does materially increase the amount and degree of fluorosis.[13]

In studies in this and other countries observations of a similar character have been made. Weaver[14] made a study of dental conditions in the British Isles and found that the children of South Shields had only about half as much dental caries experience as did the children of North Shields, which is just across the River Tyne. He attributed the variability in caries prevalence to differences in the domestic water supply, specifically to the fluoride content. The water supply of South Shields contained 1.4 p.p.m. of fluoride and that of North Shields contained 0.25 p.p.m. Ockerse[15] reported similar findings in South Africa.

This evidence, like most epidemiologic evidence, is presumptive in character,[16] but in addition to these studies on human beings there are reports from laboratory research which indicate that fluorine influences the carious process in experimental animals. A number of authors have shown that induced caries in the molars of rats may be inhibited by the addition of fluorides to the drinking water or the food and that this caries-inhibiting action is related to the amount of fluoride ingested. Also, dental caries in Syrian hamsters has been influenced in a like manner. A review of experimental caries and fluorides was made by Hodge and Sognnaes.[17]

Although it is not known that dental caries in human beings is comparable to

13. In Hereford, Texas (Table 2 and illustration) the number of continuous residents is small, and the low caries rate observed may be due to sampling error.

14. Weaver, Robert, Epidemiological Studies in the British Isles and India, in *Dental Caries and Fluorine*,[1] pp. 32-35.

15. Ockerse, T., Fluorine and Dental Caries in South Africa, in *Dental Caries and Fluorine*,[1] pp. 36-42.

16. Although the epidemiologic evidence is presumptive in character, this fact does not decrease the validity of the evidence. Chlorination of water supplies for the control of typhoid fever is based on similar presumptive evidence.

17. Hodge, H. C., and Sognnaes, R. F., Experimental Caries and a Discussion of the Mechanism of Caries Inhibition by Fluorine, in *Dental Caries and Fluorine*,[1] pp. 53-73.

induced caries in animals, such laboratory evidence lends weight to the presumption that fluorine is the active ingredient in the water supplies in areas of decreased caries rates.

Mechanism Studies

At the present time the mechanism of the action of fluoride waters on the carious process is not known; however, the limited information available sheds some light on this phenomenon. One of the more important observations made in connection with the epidemiologic studies is in regard to changes in the oral bacteriologic flora. It is a generally accepted belief that dental caries activity can be diagnosed by determining the number of Lactobacilli in the saliva. The oral flora of persons in whom caries is active shows a large number of Lactobacilli per cubic centimeter, but in persons in whom caries is inactive or absent the oral flora is negative for Lactobacilli, or the organism is present only sporadically and in low numbers.

The results of such determinations in the fluoride and nonfluoride areas, shown in Table 3, indicate that there is a definite difference in the percentage distribution of Lactobacillus counts in the saliva of children included in some of the epidemiologic studies.[8,9,18] The most striking differences were noted in the 0-100 range (inactive caries) and in those counts over the 20,000-30,000 range (active caries). The differences in the counts paralleled the differences in caries experience rates observed in these children.

Cities using waters with a fluoride content of more than 1 p.p.m. averaged 37.5 per cent in the 0-100 range compared with 17.8 per cent in the fluoride-free areas (Table 3). In the intermediate fluoride level (0.5 p.p.m.) 21.2 per cent of the counts were in the low range. Conversely, the high counts (20,000 and more) were 28.7 per cent in the fluoride areas and 52.4 per cent in the fluoride-free areas. These differences in the percentage distribution of high and low Lactobacillus counts suggest that the caries-fluorine relationship may be based on action of the fluoride waters on the oral flora. In other words, they point to a decrease in the activating forces of the carious process. This result would seem to indicate a theory of action opposed to that suggested by laboratory evidence on chemical composition of the teeth.[19]

Additional information on the mechanism of action of fluoride waters has been gained by studying persons who gave a history of change from fluoride to fluoride-free water supplies or vice versa. In Bauxite, Ark., it was observed that chil-

18. Jay, Philip, and Arnold, F. A., Jr., Epidemiological Aspects of Oral Lactobacillus Counts in Fluoride and Non-Fluoride Areas, in *Dental Caries and Fluorine*,[1] pp. 43-46.

19. Armstrong, W. D., Chemical Differences of Caries Susceptible and Immune Teeth and a Consideration of Food Sources of Fluorine, in *Dental Caries and Fluorine*,[1] pp. 47-52.

Table 3.—Percentage distribution of oral Lactobacillus counts on 12 to 14 year old children living in fluoride and nonfluoride areas*

Fluoride content of domestic water, p.p.m.	Children examined	L. acidophilus counts		Dental caries experience (rate per 100)†
		0-100, per cent	20,000 and more, per cent	
1.0	1,052	37.5	28.7	280
0.5	250	21.2	40.0	444
0.0	1,087	17.8	52.4	760

*Includes children from the following cities: Quincy, Evanston, Oak Park, Waukegan, Elgin, Elmhurst, Maywood, Aurora, Joliet and Galesburg, Ill., and Escanaba, Mich.
†Based on all children given dental examination in respective communities.

dren whose teeth were formed on a fluoride water and erupted into a fluoride-free environment experienced less dental caries than children of a neighboring community who had used fluoride-free water throughout life.[20] This finding is in accord with the results reported by Deatherage[21] on selectees in Illinois.

Observations somewhat opposite in character were made in Maywood, Ill., Garrettsville, Ohio and Escanaba, Mich.[22,23] In Maywood a study was made of children who had moved to that city at varying ages from areas using fluoride-free Lake Michigan water. With the exception of those children who had moved to Maywood prior to 4 years of age, there was no significant evidence of any inhibition of caries incidence following the change from a fluoride-free to a fluoride environment. At Garrettsville, Ohio, and Escanaba, Mich., the respective water supplies were changed from fluoride-free water to that containing increased amounts of fluorine. Dental and bacteriologic examinations in Garrettsville and bacteriologic examinations in Escanaba gave no indication of a change in caries activity in children whose teeth had formed on fluoride-free water.

Analysis of these results suggests the necessity of an increased ingestion of fluoride from birth or at least during the period of tooth formation in order to obtain beneficial effects. These results, however, are not entirely in accord with the findings of Deatherage.[24]

20. Dean, H. T., and others, Domestic Water and Dental Caries. I. A Dental Caries Study, Including *L. Acidophilus* Estimations, of a Population Severely Affected by Mottled Enamel and Which for the Past 12 Years Has Used a Fluoride-Free Water. *Pub. Health Rep.* 56:363 (February 28) 1941.

21. Deatherage, C. F., Fluoride Domestic Waters and Dental Caries Experience in 2026 White Illinois Selective Service Men. *J. D. Res.* 22:129 (April) 1943.

22. Arnold, F. A., Jr.; Dean, H. T., and Elvove, E., Domestic Water and Dental Caries. IV. Effect of Increasing the Fluoride Content of a Common Water Supply on the *Lactobacillus Acidophilus* Counts of the Saliva. *Pub. Health Rep.* 57:773 (May 22) 1942.

23. Arnold, F. A., Jr., The Possibility of Reducing Dental Caries by Increasing Fluoride Ingestion, in *Dental Caries and Fluorine*,[1] pp. 99-107.

24. Deatherage, C. F., A Study of Fluoride Domestic Waters and Dental Caries Experience in 263 White Illinois Selective Servicemen Living in Fluoride Areas Following the Period of Calcification of the Permanent Teeth. *J. D. Res.* 22:173 (June) 1943.

Discussion

A logical assumption, in view of the evidence so far presented, is that dental caries may be controlled by fluorination of water supplies. The unusually high prevalence of this disease makes it particularly suited to a type of control measure which is on a communal basis and is not dependent on individual volition.

Fluorination of water is economical. According to Harris,[25] the per capita cost per year is about 7½ cents. This figure varies, depending on the price of the fluoride used and the amount already present in the water supply.

The results that might be expected from such a control measure were discussed in a previous article.[26]

In comparing the dental caries picture of the children of Aurora where the domestic water contains 1.2 p.p.m. of fluoride with that of children using fluoride-free water, it was noted that in Aurora (1) about six times as many children had had no dental caries experience; (2) there was about 60 per cent less dental caries experience; (3) there was a decrease of almost 75 per cent in mortality of the permanent first molar, and (4) approximately 95 per cent less caries occurred on the proximal surfaces of the four upper incisors.

Attention is called to the fact that the evidence to date in regard to the effect of water-borne fluoride on human dental caries is of an epidemiologic nature. At present one can only assume that the ingestion of a water which has fluoride added artificially will produce the same effects as the ingestion of a natural fluoride water. All evidence suggests that it will, but the final answer to this question awaits the results of research studies now

25. Harris, W. L., Experience in the Application of Fluoride to a Public Water Supply, in *Inservice Training Course for Waterworks Personnel Lectures*. Ann Arbor: University of Michigan School of Public Health, May 22-24, 1945.

26. Arnold, F. A., Jr., The Role of Fluorides in Preventive Dentistry. *J.A.D.A.* 30:499 (April 1) 1943.

in progress. In eight communities in the United States and Canada (Grand Rapids, Mich; Newburgh, N. Y.; Midland, Mich.; Brantford, Ont.; Sheboygan, Wis.; Ottawa, Kan.; Evanston, Ill., and Marshall, Texas) fluorine is being added to the domestic water supply for the purpose of studying the effect on dental caries. The first of these communities to start adding the fluorine was Grand Rapids, Mich. This study is sponsored by the U. S. Public Health Service with the cooperation of the Michigan Department of Health and the University of Michigan. Fluorination was begun in January 1945, and to date no major mechanical difficulties have been encountered. More complete technical details of this problem were given by Harris.[25]

The influence of fluorination on the teeth of present inhabitants of these communities poses another question. Both Deatherage[24] and Klein[27] have reported beneficial effects in persons who had moved from supposedly fluoride-free areas to fluoride areas. However, the limited epidemiologic evidence in Maywood suggests that fluorination of water supplies may have little or no effect on the carious process in teeth formed on fluoride-free waters.

In view of the latter evidence, an abrupt beneficial change in dental caries incidence would not be expected to follow the fluorination of a domestic water supply. Preliminary tabulation of results of annual examinations in Grand Rapids supports this contention. It appears difficult to explain, however, why numerous topical applications of fluoride, as would occur from the ingestion of fluorinated waters, would not have over a period of years a beneficial effect somewhat similar to topical application of stronger solutions of fluoride. It may be that the diagnostic methods used were not critical enough to demonstrate the minor changes in the incidence of caries and that more time will be required for clarification of the results.

Attention is called to the fact that other factors such as climatic conditions, culinary habits and unusual mineral constituents of water supplies may play an important role. Further research studies together with the results of projects now in operation should shed light on some of these aspects of the problem.

Summary

Epidemiologic evidence indicates that the ingestion during the formative period of the teeth of natural waters containing as little as 1 part per million of fluorine is accompanied by a decrease in the prevalence of dental caries. Presumptive evidence points to fluorine as the active inhibitory agent and suggests the possibility of adding controlled amounts of fluorine to water supplies as a practical method of preventing or inhibiting caries.

Studies of such a procedure are now in progress, but final evaluation must be deferred during the time required for teeth to develop and erupt under this changed environment. At present it is deemed advisable to await the results of these research projects before an unqualified recommendation for mass fluorination of water supplies is made.

27. Klein, Henry, Dental Caries Experience in Relocated Children Exposed to Water Containing Fluorine. I. Incidence of New Caries after 9 Years of Exposure Among Previously Caries-Free Permanent Teeth. *Pub. Health Rep.* 60:1462 (December 7) 1945.

Prepaid Medical Care.—The Council on Medical Service of the American Medical Association reports that 5,000,000 persons are covered by medical society approved prepayment medical care plans.—*Illinois M. J. 92:4, October 1947.*

SODIUM FLUORIDE SOLUTIONS: TECHNIC FOR APPLICATION TO THE TEETH

John W. Knutson, D.D.S., D.P.H., Washington, D. C.

INITIAL reports concerning solutions of sodium fluoride applied topically to the teeth as a prophylactic measure against caries[1, 2] have been confirmed by extensive clinical experience.[3-8] Furthermore, the results of clinical studies designed specifically for the purpose of developing and refining one topical fluoride technic have demonstrated that four applications of a 2 per cent solution of sodium fluoride to the teeth of children effect a 40 per cent reduction in the incidence of dental caries.[5-7] It is the purpose of this presentation to describe and illustrate this particular technic of application.

Senior Dental Surgeon; Chief, Dental Public Health Section, States Relations Division, U. S. Public Health Service.

1. Bibby, B. G., New Approach to Caries Prophylaxis. *Tufts D. Outlook* 15:4 (May) 1942.

2. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. *Pub. Health Rep.* 58:1701 (November 19) 1943.

3. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. II. Report of Findings for the Second Study Year. *Pub. Health Rep.* 60:1085 (September 14) 1945.

4. Knutson, J. W., and Armstrong, W. D., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. III. Report of Findings for the Third Study Year. *Pub. Health Rep.* 61:1683 (November 22) 1946.

5. Jordan, W. A.; Wood, O. B.; Allison, J. A., and Irwin, V. D., The Effects of Various Numbers of Topical Applications of Sodium Fluoride. *J.A.D.A.* 33: 1385 (November 1) 1946.

6. Knutson, J. W.; Armstrong, W. D., and Feldman, F. M., The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. IV. Report of Findings with Two, Four and Six Applications. *Pub. Health Rep.* 62:425 (March 21) 1947.

7. Galagan, D. J., and Knutson, J. W., The Effect of Topically Applied Fluorides on Dental Caries Experience. V. Report of Findings with Two, Four and Six Applications of Sodium Fluoride and of Lead Fluoride. *Pub. Health Rep.* 62:1477 (October 10) 1947.

8. Bibby, B. G., and Turesky, S. S., A Note on the Duration of Caries Inhibition Produced by Fluoride Applications. *J. D. Res.* 26:105 (April) 1947.

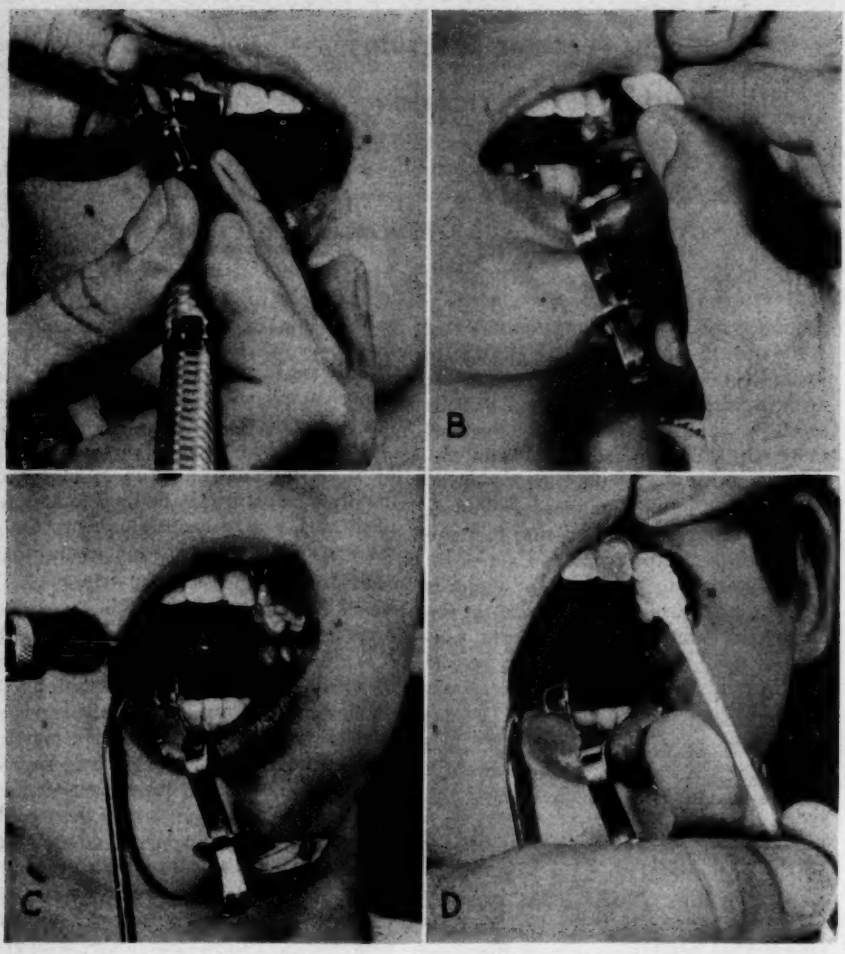
Technic of Application

Cleanse the Teeth.—The first step in the topical application of sodium fluoride described here consists of a thorough cleansing of the coronal surfaces of the teeth. A motor-driven rubber cup and fine pumice paste may be used to accomplish this part (illustration, A). Only the first in the series of four applications is preceded by dental prophylaxis.

Isolate With Cotton Rolls.—The cleansed teeth are blocked off or isolated with No. 2 cotton rolls. Half the teeth, those in an upper quadrant and in the opposing lower quadrant, may be isolated at one time as illustrated in B. Cutting the ends of the cotton rolls at 45 to 60 degree angles facilitates their proper placement. Rolls used in the lower part of the mouth are held in position with cotton roll holders. When the cotton rolls are positioned properly they are clear of the teeth so they do not absorb the applied solution.

Dry With Compressed Air.—After the teeth have been isolated with cotton rolls they are dried with compressed air. From 15 to 20 pounds of pressure is used to facilitate adequate drying of the interproximal tooth surfaces (illustration, C).

Wet Crown Surfaces With Sodium Fluoride.—The fourth step in the procedure consists of applying a 2 per cent solution of sodium fluoride (C. P. sodium fluoride in distilled water) to the dried enamel surfaces of the teeth. A cotton applicator or light spray may be used (illustration,



Technic of application of solutions of sodium fluoride to the teeth. A, thoroughly cleanse the crown surfaces, using motor-driven rubber cup and fine pumice paste. B, isolate the teeth with No. 2 cotton rolls. C, dry the teeth, preferably with compressed air. D, wet the crown surfaces with a 2 per cent solution of sodium fluoride and allow to dry in air

D). When the solution is applied properly it visibly wets all surfaces including the interproximal surfaces. The applied solution is permitted to dry in air for approximately three minutes. On completion of the procedure, the mouth may be rinsed with water. However, rinsing with water is not an essential or important part of procedure and may be dispensed with if desired.

The second, third and fourth applications of the solution of sodium fluoride are made at intervals of approximately one week. As stated previously, in the series of four applications only the first is preceded by dental prophylaxis; that

is, the first step is omitted in making the second, third and fourth applications.

Duration of Prophylactic Effect

The duration of the caries-inhibiting effect of topically applied fluorides is not fully known. The results of clinical studies continued for three to five years indicate that there is no appreciable loss in prophylactic value with the passage of time.[3, 4, 8]

In order to provide a practical basis for rendering topical applications of fluoride to the teeth of children, it is suggested that a series of applications be given at the ages of 3, 7, 10 and 13 years. These ages should be varied in accordance with the tooth eruption pattern of the individual child. An application at 3 years of age would provide protection for the deciduous teeth. Subsequent applications would provide protection for the permanent teeth during the period of changing dentition: the incisors and first molars at age 7, the bicuspids and cuspids at age 10 and the second molars at age 13.

STUDIES IN DENTAL PUBLIC HEALTH ADMINISTRATION: III. ADMINISTRATIVE FACTORS IN A DENTAL TREATMENT PROGRAM AS MEASURED BY LOST TIME ANALYSIS

J. M. Wisan, D.D.S., M.S.P.H., and N. W. Chilton, D.D.S., M.P.H., Trenton, N. J.

THE planning of public health programs for dental treatment affords many difficulties. Before the public and its representative bodies can be asked to support such an undertaking, the need for the program must be ascertained and the cost of treatment must be calculated. In other publications an attempt has been made to throw some light on these problems.[1-3]

When plans for public health programs for dental treatment are projected, two factors, the need and the cost, often are the bases for the plans being laid by the dental administrative officer. On the basis of the number of children in each age group and the existing dental defects, as ascertained by surveys of the preschool and school populations, the administrator can determine approximately the number of dentist-hours per year necessary to meet the needs of the selected group. By working on the concept of complete treatment[4] of selected persons of a certain age group followed by treatment of the yearly incremental defects, administrators have calculated the

Division of Dental Health, New Jersey State Department of Health.

1. Wisan, J. M.; Galagan, D. J., and Chilton, N. W., Studies in Dental Public Health Administration: I. Cost Analysis of the New Jersey Dental Treatment Program, 1944-45. *J.A.D.A.* 34:322 (March 1) 1947.
2. Chilton, N. W., and Greenwald, L. E., Studies in Dental Public Health Administration: II. The Role of Roentgenograms in Public Health Dental Surveys. *J. D. Res.* 26:129 (April) 1947.
3. Wisan, J. M., State Dental Programs, in American Public Health Association, *Dentistry in Public Health*. Philadelphia: W. B. Saunders Co. In press.

4. The types of treatment found in the various types of dental programs may be briefly summarized as follows:[2] (1) provide the most necessary dental treatments for the greatest possible number of individuals; (2) provide limited dental treatments to children, and (3) provide more complete dental treatment. This paper deals with the second classification.

Table 1.—Record of lost time

Date_____
Month Day Year
Time set aside by dentist for appointments from _____ to _____
Time lost_____
Reason for time lost_____
Pupils were to be sent from_____
Municipality
_____
County
Person responsible for scheduling patients
_____
Name and address of dentist_____
Name
_____
Address

funds needed to add new age groups to their treatment programs.[5,6]

This procedure for the projection of public health programs for dental treatment has come into fairly wide usage in recent years, now that dental personnel is becoming more available. In this type of reasoning, however, no consideration is given to the fact that frequently a considerable number of the calculated dentist-hours are unused so far as dental treatment of the group to be treated is concerned. This study was undertaken to call attention to this fact and to analyze the reasons for this lost time (time not spent directly in treating patients).

Methods

All individual reports for the fiscal year July 1, 1945 to June 30, 1946 of the dental treatment programs conducted under the supervision of the Division of Dental Health of the New Jersey State Department of Health were examined to ascertain the amount of time which was spent by each operating dentist in actual treatment of patients. All other time which the dentist spent in the program was classified as lost time. The amount of lost time was determined for each dentist and for each program, and the reasons for the occurrence were noted.

At first a separate form for reporting of lost time by each dentist was utilized (Table 1). Because of the difficulties of obtaining accurate reporting on the new administrative form, however, it was discarded in favor of the more accurate and more laborious method of careful examination of the individual records.

Results

In order to assure anonymity to the dentists and to the programs in which they are operating and not reflect unjustly on the persons and communities involved, the results are recorded in code; that is, numbers for dentists and letters for programs.

The tabulation of lost time incurred by the various dentists in their respective programs, with the percentage of children whose treatment had been completed, is presented in Table 2. In certain programs two dentists worked on the same group of children, with the result that completion percentages are available only for that program rather than for each dentist operating therein.

In Table 2 a subdivision of lost time into productive and nonproductive time also has been made. By productive lost time is meant time spent to the ultimate benefit of the dental program in ways other than directly operating on children, since it was felt that some of the time that the dentist is not operating is important in the educational, promotional and maintenance aspects of the program.

The productive and nonproductive lost time are presented in both absolute figures and percentages of total lost time. The percentage of lost time in each program varied from no lost time in several instances to 57.9 per cent for dentist No. 32 in program L.

5. Strusser, Harry, Dental Problems in Postwar Planning. *J.A.D.A.* 32:991 (August) 1945.
6. Sebelius, C. L., Five-Year Time and Treatment Dental Study in Pickett County, Tennessee. *J.A.D.A.* 33:976 (August) 1946.

Table 2.—Comparison of lost time by dentists, location and program

Dentist (number); location (letter)	Type of program	Total operating time, hr.	Total lost time, hr.	Lost time, per cent	Completions, per cent	Productive lost time		Nonproductive lost time	
						Minutes	Per cent	Minutes	Per cent
1, A	Private office	54	4.3	8.0	59.3	—	—	255	100.0
2, A	Private office	4	—	—	25.0	—	—	—	—
3, A	Private office	6	—	—	100.0	—	—	—	—
4, A	Private office	12	3.0	25.0	—	—	—	180	100.0
5, A	Private office	14	—	—	10.0	—	—	—	—
Total, A	Private office	90	7.3	8.1	43.1	—	—	435	100.0
6, B	Clinic	114	18.4	16.1	—	115	10.4	990	89.6
7, B	Clinic	27	8.2	30.4	—	330	67.3	160	32.7
Total, B	Clinic	141	26.6	18.9	60.0	445	27.9	1,150	72.1
8, C	Private office	12	0.3	2.5	100.0	—	—	20	100.0
9, C	Private office	7	2.5	35.7	—	—	—	150	100.0
10, C	Private office	27	0.1	0.4	75.0	—	—	5	100.0
Total, C	Private office	46	2.9	6.3	71.7	—	—	175	100.0
11, D	Private office	54	4.0	7.4	50.9	—	—	240	100.0
12, D	Mobile clinic	1,029	64.4	6.3	81.0	1,350	34.9	2,515	65.1
13, E	Private office	66	4.1	6.2	66.2	—	—	245	100.0
14, E	Private office	42	—	—	72.0	—	—	—	—
Total, E	Private office	108	4.1	3.8	67.8	—	—	245	100.0
15, F	Private office	82.5	13.8	16.7	46.7	—	—	825	100.0
16, F	Private office	102	16.1	15.8	46.1	—	—	965	100.0
17, F	Private office	57.5	6.2	10.8	19.5	—	—	370	100.0
18, F	Private office	114	17.5	15.4	50.0	—	—	1,050	100.0
Total, F	Private office	356	53.6	15.1	41.8	—	—	3,210	100.0
19, G	Clinics	528	25.1	4.8	63.8	210	16.2	1,295	83.8
20, H	Clinic	499	75.3	15.1	44.1	405	9.0	4,110	91.0
21, I	Clinic	79	6.6	8.4	69.8	45	11.4	350	88.6
22, I	Clinic	105	8.4	8.0	100.0	60	11.9	445	88.1
23, I	Clinic	149	21.0	14.1	71.4	420	33.3	840	66.7
24, I	Clinic	30	5.6	18.7	—	80	23.9	255	76.1
Total, I	Clinic	363	41.6	11.5	55.4	605	24.3	1,890	75.7
25, J	Trailer	180.5	36.3	19.6	—	1,905	87.4	270	12.6
26, J	Trailer	96	11.8	12.3	—	420	59.2	290	40.8
Total, J	Trailer	276.5	48.1	17.4	37.9	2,325	81.8	560	18.2
27, K	Private office	36	1.3	3.6	10.0	—	—	75	100.0
28, K	Private office	84	—	—	97.8	—	—	—	—

Table 2.—Comparison of lost time by dentists, location and program (contd.)

Dentist (number); location (letter)	Type of program	Total operating time, hr.	Total lost time, hr.	Lost time, per cent	Completions, per cent	Productive lost time		Nonproductive lost time	
						Minutes	Per cent	Minutes	Per cent
29, K	Private office	29	1.3	4.5	11.5	—	—	80	100.0
30, K	Private office	31	4.3	13.9	—	—	—	255	100.0
31, K	Private office	96	23.5	24.5	71.4	—	—	1,410	100.0
Total, K	Private office	276	30.4	11.0	52.3	—	—	1,820	100.0
32, L	Private office	48	27.8	57.9	72.8	90	3.6	1,580	96.4
33, L	Private office	96	11.1	11.6	88.8	—	—	665	100.0
34, L	Private office	245.3	22.7	9.3	95.0	—	—	1,360	100.0
35, L	Private office	15.3	—	—	51.8	—	—	—	—
36, L	Private office	134	23.8	17.8	93.3	—	—	1,425	100.0
37, L	Private office	40	—	—	94.8	—	—	—	—
38, L	Private office	34.5	1.3	3.8	18.6	—	—	75	100.0
39, L	Private office	70	10.0	14.3	80.8	—	—	600	100.0
40, L	Private office	42	3.0	7.1	59.4	—	—	180	100.0
41, L	Private office	58	15.9	27.4	60.7	—	—	955	100.0
42, L	Private office	116	3.3	2.9	76.3	—	—	220	100.0
43, L	Private office	116	18.0	15.5	83.4	—	—	1,080	100.0
Total, L	Private office	1,015.1	136.9	13.5	79.7	90	1.9	8,140	98.1
44, M	Clinic	125	—	—	—	—	—	—	—
45, M	Clinic	75	—	—	—	—	—	—	—
Total, M	Clinic	200	—	—	21.8	—	—	—	—
46, N	Clinic	48.5	0.3	0.6	—	—	—	20	100.0
47, N	Clinic	65	—	—	—	—	—	—	—
Total, N	Clinic	113.5	0.3	0.3	54.9	—	—	20	100.0
48, O	Private office	34	1.0	2.9	58.8	—	—	60	100.0
49, O	Private office	133.5	—	—	51.2	—	—	—	—
50, O	Private office	4	—	—	—	—	—	—	—
51, O	Private office	131	16.3	12.4	37.8	—	—	975	100.0
52, O	Private office	16	0.3	1.9	75.0	—	—	20	100.0
53, O	Private office	147	—	—	67.0	—	—	—	—
54, O	Private office	103.5	5.0	4.8	5.0	—	—	300	100.0
55, O	Private office	18.3	—	—	100.0	—	—	—	—
56, O	Private office	12	—	—	22.2	—	—	—	—
57, O	Private office	34.5	0.5	1.4	54.5	—	—	30	100.0
58, O	Private office	46.5	—	—	69.0	—	—	—	—
59, O	Private office	4	—	—	83.3	—	—	—	—
Total, O	Private office	684.3	23.1	3.4	58.3	—	—	1,385	100.0
60, P	Clinic	708	146.3	20.7	95.7	795	9.1	7,985	90.9
61, Q	Private office	78	2.5	3.2	64.3	—	—	150	100.0
62, Q	Private office	102	—	—	72.4	—	—	—	—
63, Q	Private office	17	2.5	14.7	100.0	—	—	150	100.0
64, Q	Private office	34	3.5	10.3	60.0	—	—	210	100.0

Table 2.—Comparison of lost time by dentists, location and program (contd.)

Dentist (number); location (letter)	Type of program	Total operating time, hr.	Total lost time, hr.	Lost time, per cent	Completions, per cent	Productive lost time		Nonproductive lost time	
						Minutes	Per cent	Minutes	Per cent
65, Q	Private office	48	3.8	7.9	100.0	180	80.2	45	19.8
Total, Q	Private office	279	12.3	4.4	80.7	180	24.5	555	75.5
66, R	Trailer	11	—	—	—	—	—	—	—
67, S	Clinic	225	11.4	5.1	—	110	16.1	575	83.9
68, S	Clinic	446	53.7	12.0	—	—	—	3,220	100.0
Total, S	Clinic	671	65.1	9.7	77.3	110	2.8	3,795	97.2
69, T	Clinic	187	9.3	5.0	49.1	—	—	560	100.0
70, U	Private office	68	1.3	1.9	40.0	80	100.0	—	—
71, V	Clinic	1,067.5	87.8	8.2	—	1,305	24.8	3,960	75.2
72, V	Clinic	45	10	22.2	—	140	38.9	220	61.1
Total, V	Clinic	1,112.5	97.8	8.8	81.0	1,445	25.7	4,180	74.3
73, W	Trailer	945	69.8	7.4	78.6	3,880	92.7	305	7.3
74, X	Private office	26.7	0.7	2.6	72.4	—	—	40	100.0
75, X	Private office	62.3	4.3	6.9	75.0	—	—	255	100.0
76, X	Private office	115.5	4.8	4.2	62.5	—	—	285	100.0
77, X	Private office	16	—	—	—	—	—	—	—
Total, X	Private office	220.5	9.8	4.4	60.6	—	—	580	100.0
78, Y	Clinic	203	4.5	2.2	41.7	80	28.6	190	71.4
79, Z	Clinic	278.6	34.1	12.2	45.9	1,175	57.4	870	42.6
80, AA	Private office	6	—	—	100.0	—	—	—	—
81, AA	Private office	30	—	—	85.7	—	—	—	—
82, AA	Private office	27	—	—	25.0	—	—	—	—
83, AA	Private office	11.5	0.5	4.3	20.0	—	—	30	100.0
84, AA	Private office	21.5	—	—	72.7	—	—	—	—
85, AA	Private office	14	—	—	100.0	—	—	—	—
Total, AA	Private office	110	0.5	0.5	73.5	—	—	30	100.0

For purposes of comparison the percentage of completed work is presented alongside the percentage of lost time. It was noted that no correlation existed between these two percentages, probably because completions are dependent on so many other diverse factors.

In Table 3 is summarized the lost time incurred in the three general types of programs utilized in New Jersey. The lowest percentage of lost time (8.06 per cent) occurred in the mobile type of program, which also showed the highest completion rate (71.6 per cent). The

Table 3.—Recapitulation by type of program

Type of program	Operating time, hr.	Lost time, hr.	Lost time, per cent	Children treated	Cases completed	Cases completed, per cent
Private office	3,306.9	286.2	8.65	1,834	1,200	65.4
Clinic	5,004.6	526.0	10.51	2,555	1,772	69.4
Trailer and mobile clinic*	2,261.5	182.3	8.06	1,343	962	71.6
Total	10,573.0	994.5	9.41	5,732	3,934	68.6

*Includes new Ocean County trailer which was in operation only eleven hours and the summer program at Kiddie Keep-Well Kamp, which lowers markedly the percentage of cases completed.

clinic programs had greater lost time (10.51 per cent) than the private offices (8.65 per cent), but their completion rate was also higher (69.4 per cent versus 65.4 per cent).

When the productive and nonproductive lost time was summarized (Table 4), it was found that most of the lost time in the mobile programs was productive and that almost all the lost time in the private office programs was nonproductive.

Comparison of the percentages of nonproductive lost time, as shown in Table 5, indicates that the mobile programs were operating at a low lost time figure (2.49 per cent), with the highest rate of completion (71.6 per cent). The clinic and private office programs incurred almost the same percentage of lost time (8.67 and 8.48 per cent), but the clinics had a higher completion rate than the private offices (69.4 per cent versus 65.4 per cent).

The cost of the nonproductive lost time (funds which might be considered completely unproductive from the point of view of actual treatment of children) also appears in Table 5. These figures were arrived at by considering the payments made to the operating dentists on an hourly basis in each type of program (trailers, mobile clinics and clinics at $4 an hour; private offices at $6 an hour). There was a difference in the cost of nonproductive lost time of only $54.60 between the clinic and private office programs. The percentage of completions differed by 4 per cent—no mean difference considering the number of children treated in each type of program (1,834 children in private offices and 2,555 in clinics).

A breakdown of the causes of lost time was considered important (Tables 6 and 7). In Table 8 is a summary of the causes of lost time shown in Table 6, according to the various types of programs.

Table 4.—Recapitulation of classification of lost time

Type of program	Total minutes	Productive*		Nonproductive	
		Minutes	Per cent	Minutes	Per cent
Private office	17,165	350	2.0	16,815	98.0
Clinic	31,315	5,270	16.8	26,045	83.2
Trailer and mobile clinic	10,935	7,555	69.1	3,380	30.9
Total	59,415	13,175	22.2	46,240	77.8

*Productive lost time means any lost time which was used to the ultimate benefit of the dental health program.

Table 5.—Recapitulation of nonproductive lost time

Type of program	Operating time, hr.	Nonproductive lost time		Completed cases, per cent	Total cost	Cost of nonproductive lost time
		Hours	Per cent			
Private office	3,306.9	280.3	8.48	65.4	$19,841.40	$1,681.80
Clinic	5,004.6	434.1	8.67	69.4	20,018.40	1,736.40
Trailer and mobile clinic	2,261.5	56.3	2.49	71.6	9,046.00	255.20
Total	10,573.0	770.7	7.29	68.6	$48,905.80	$3,643.40

Administration appears to be the category into which the greatest amount of lost time fell, but in the mobile programs only slightly more than a third of the lost time could be charged to administration, the remainder being distributed throughout other classifications. In the private office programs almost 85 per cent of all lost time was due to administrative factors, this figure being slightly less in clinic programs (76 per cent). Conferences and visits caused more lost time in the clinic and mobile programs, which was to be expected since these programs are oftentimes demonstration units. Transportation of the children and particularly of the mobile units and their maintenance took up about 18 per cent each of the time lost in the mobile programs. Again, this was to be expected since these units have to be moved from school to school, and the equipment is therefore more likely to be damaged.

In program G, two clinics are operated under similar circumstances, the variable being the area from which the children are drawn. In one clinic the children are drawn from the community in which the clinic is located, so that there is no transportation problem, and the completion percentage is close to 100 per cent. In the other clinic to which children are sent from a relatively wide rural area, transportation difficulties are encountered, producing a high percentage of lost time classified under transportation and a lower rate of completion. When the figures for both these clinics were averaged, 41.9 per cent of the lost time was ascribed to transportation (Table 6), and the rate of completion was only 63.8 per cent (Table 2). This gives some idea of the effect of transportation difficulties on the efficiency of stationary units for dental treatment.

Interpretation

The effectiveness of programs for dental treatment may be estimated by such factors as the rate of completion[7] and of lost permanent teeth.[8,9] These measurements, however, do not give any indication of the efficiency of the administration of funds devoted to public health programs for dental treatment. It is our opinion that analysis of lost time and the factors contributing to it gives a fairly reliable indication of just how efficient the administration of the program may be.

From our experience, reports submitted by dentists working full time in the program are much more reliable than those submitted by part time operators, particularly those working in private offices. In contemplation of the figures presented in this analysis this fact must be taken into consideration; namely, that

7. *A Dental Care Plan for Low Income Groups.* Chicago: Council on Dental Health, American Dental Association, 1945.

8. Wisan, J. M., Evaluation of Dental Programs for Children. *Am. J. Pub. Health* 28:859 (July) 1938.

9. Knutson, J. W.; Maday, C., and Jordan, W. A., Simplified Appraisal of Dental Health Programs. *Pub. Health Rep.* 62:413 (March 21) 1947.

Table 6.—Analysis of causes of lost time

Dentist	Location	Type of program	Total minutes	Administration		Transportation		Weather		Conferences and visitors		Health education		Maintenance		Other	
				Min.	%	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%
1	A	Private office	255	255	100.0	—	—	—	—	—	—	—	—	—	—	—	—
2	A	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	A	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	A	Private office	180	—	—	180	100.0	—	—	—	—	—	—	—	—	—	—
5	A	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	A	Private office	435	255	58.6	180	41.4	—	—	—	—	—	—	—	—	—	—
6	B	Clinic	1,105	1,095	99.2	—	—	—	—	—	—	10	0.8	—	—	—	—
7	B	Clinic	490	160	32.7	—	—	—	—	180	36.8	150	30.5	—	—	—	—
Total	B	Clinic	1,595	1,255	78.8	—	—	—	—	180	11.3	160	9.9	—	—	—	—
8	C	Private office	20	20	100.0	—	—	—	—	—	—	—	—	—	—	—	—
9	C	Private office	150	150	100.0	—	—	—	—	—	—	—	—	—	—	—	—
10	C	Private office	5	5	100.0	—	—	—	—	—	—	—	—	—	—	—	—
Total	C	Private office	175	175	100.0	—	—	—	—	—	—	—	—	—	—	—	—
11	D	Private office	240	240	100.0	—	—	—	—	—	—	—	—	—	—	—	—
12	D	Mobile clinic	3,865	1,335	34.5	1,335	34.5	275	7.1	220	5.7	—	—	455	11.8	245	6.4
13	E	Private office	245	245	100.0	—	—	—	—	—	—	—	—	—	—	—	—
14	E	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	E	Private office	245	245	100.0	—	—	—	—	—	—	—	—	—	—	—	—
15	F	Private office	825	825	100.0	—	—	—	—	—	—	—	—	—	—	—	—
16	F	Private office	965	785	81.3	—	—	180	18.7	—	—	—	—	—	—	—	—
17	F	Private office	370	370	100.0	—	—	—	—	—	—	—	—	—	—	—	—
18	F	Private office	1,050	870	82.8	—	—	180	17.2	—	—	—	—	—	—	—	—
Total	F	Private office	3,210	2,850	88.8	—	—	360	11.2	—	—	—	—	—	—	—	—

Total	F	Private office	3,210	2,850	88.8	—	—	360	11.2	—	—	—	—	—	—	—	—
19	G	Clinics	1,505	260	17.3	630	41.9	285	18.9	210	13.9	—	—	120	8.0	—	—
20	H	Clinic	4,515	4,000	88.7	—	—	250	5.5	—	—	—	—	—	—	265	5.8
21	I	Clinic	395	350	88.7	—	—	—	—	45	11.3	—	—	—	—	—	—
22	I	Clinic	505	400	79.2	—	—	—	—	105	20.8	—	—	—	—	—	—
23	I	Clinic	1,260	1,260	100.0	—	—	—	—	—	—	—	—	—	—	—	—
24	I	Clinic	335	110	32.9	200	59.7	—	—	—	—	—	—	—	—	25	7.4
Total	I	Clinic	2,495	2,120	85.0	200	8.0	—	—	150	6.0	—	—	—	—	25	1.0
25	J	Trailer	2,175	785	36.1	—	—	—	—	200	9.2	—	—	905	41.6	285	13.1
26	J	Trailer	710	—	—	—	—	—	—	15	2.1	—	—	405	57.1	290	40.8
Total	J	Trailer	2,885	785	27.2	—	—	—	—	215	7.5	—	—	1,310	45.4	575	19.9
27	K	Private office	75	75	100.0	—	—	—	—	—	—	—	—	—	—	—	—
28	K	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29	K	Private office	80	80	100.0	—	—	—	—	—	—	—	—	—	—	—	—
30	K	Private office	255	255	100.0	—	—	—	—	—	—	—	—	—	—	—	—
31	K	Private office	1,410	1,410	100.0	—	—	—	—	—	—	—	—	—	—	—	—
Total	K	Private office	1,820	1,820	100.0	—	—	—	—	—	—	—	—	—	—	—	—
32	L	Private office	1,670	1,410	84.4	—	—	180	10.8	—	—	80	4.8	—	—	—	—
33	L	Private office	665	665	100.0	—	—	—	—	—	—	—	—	—	—	—	—
34	L	Private office	1,360	640	47.1	180	13.2	540	39.7	—	—	—	—	—	—	—	—
35	L	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
36	L	Private office	1,425	1,425	100.0	—	—	—	—	—	—	—	—	—	—	—	—
37	L	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
38	L	Private office	75	75	100.0	—	—	—	—	—	—	—	—	—	—	—	—
39	L	Private office	600	330	55.0	—	—	270	45.0	—	—	—	—	—	—	—	—
40	L	Private office	180	—	—	—	—	180	100.0	—	—	—	—	—	—	—	—
41	L	Private office	955	775	74.0	—	—	180	26.0	—	—	—	—	—	—	—	—
42	L	Private office	220	220	100.0	—	—	—	—	—	—	—	—	—	—	—	—
43	L	Private office	1,080	870	80.6	—	—	210	19.4	—	—	—	—	—	—	—	—
Total	L	Private office	8,230	6,410	77.8	180	2.9	1,560	19.0	—	—	80	1.0	—	—	—	—

Table 6.—Analysis of causes of lost time (contd.)

Dentist	Location	Type of program	Total minutes	Administration		Transportation		Weather		Conferences and visitors		Health education		Maintenance		Other	
				Min.	%	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%	Min.	%
44	M	Clinic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
45	M	Clinic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	M	Clinic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
46	N	Clinic	20	20	100.0	—	—	—	—	—	—	—	—	—	—	—	—
47	N	Clinic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	N	Clinic	20	20	100.0	—	—	—	—	—	—	—	—	—	—	—	—
48	O	Private office	60	—	—	—	—	—	—	—	—	—	—	—	—	60	100.0
49	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
51	O	Private office	975	975	100.0	—	—	—	—	—	—	—	—	—	—	—	—
52	O	Private office	20	20	100.0	—	—	—	—	—	—	—	—	—	—	—	—
53	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
54	O	Private office	300	300	100.0	—	—	—	—	—	—	—	—	—	—	—	—
55	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
56	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57	O	Private office	30	30	100.0	—	—	—	—	—	—	—	—	—	—	—	—
58	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
59	O	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	O	Private office	1,385	1,325	95.9	—	—	—	—	—	—	—	—	—	—	60	4.1
60	P	Clinic	8,780	6,990	79.6	—	—	400	4.6	595	6.8	—	—	80	0.9	715	8.1
61	Q	Private office	150	150	100.0	—	—	—	—	—	—	—	—	—	—	—	—
62	Q	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
63	Q	Private office	150	60	40.0	—	—	—	—	—	—	—	—	—	—	90	60.0
64	Q	Private office	210	210	100.0	—	—	—	—	—	—	—	—	—	—	—	—
65	Q	Private office	225	225	100.0	—	—	—	—	—	—	—	—	—	—	—	—
Total	Q	Private office	735	645	87.8	—	—										

65	Q	Private office	225	225	100.0	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	Q	Private office	735	645	87.8	—	—	—	—	—	—	—	—	—	—	90	12.2
66	R	Trailer	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
67	S	Clinic	685	575	84.0	—	—	—	—	110	16.0	—	—	—	—	—	—
68	S	Clinic	3,220	2,915	90.5	285	8.9	—	—	—	—	—	—	—	—	20	0.6
Total	S	Clinic	3,905	3,490	89.4	285	7.3	—	—	110	2.8	—	—	—	—	20	0.5
69	T	Private office	80	—	—	—	—	—	—	80	100.0	—	—	—	—	—	—
70	U	Clinic	560	380	67.9	—	—	—	—	—	—	—	—	180	32.1	—	—
71	V	Clinic	5,265	4,040	76.8	—	—	260	4.9	455	8.7	—	—	155	2.9	355	6.7
72	V	Clinic	360	220	61.2	—	—	—	—	140	38.8	—	—	—	—	—	—
Total	V	Clinic	5,625	4,260	75.7	—	—	260	4.6	595	10.6	—	—	155	2.8	355	6.3
73	W	Trailer	4,185	1,845	44.2	655	15.7	55	1.2	905	21.7	330	7.8	165	3.9	230	5.5
74	X	Private office	40	40	100.0	—	—	—	—	—	—	—	—	—	—	—	—
75	X	Private office	255	255	100.0	—	—	—	—	—	—	—	—	—	—	—	—
76	X	Private office	285	285	100.0	—	—	—	—	—	—	—	—	—	—	—	—
77	X	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	X	Private office	580	580	100.0	—	—	—	—	—	—	—	—	—	—	—	—
78	Y	Clinic	270	190	70.5	—	—	—	—	80	29.5	—	—	—	—	—	—
79	Z	Clinic	2,045	830	40.8	—	—	300	14.8	80	3.9	550	26.9	285	13.6	—	—
80	AA	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
81	AA	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
82	AA	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
83	AA	Private office	30	30	100.0	—	—	—	—	—	—	—	—	—	—	—	—
84	AA	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
85	AA	Private office	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	AA	Private office	30	30	100.0	—	—	—	—	—	—	—	—	—	—	—	—

Table 7.—Classification of lost time factors

Administration
Patients late
Patients did not arrive
Insufficient patients
Started late; left early
Examinations at school (poor scheduling)
Executive duties
Record keeping and statistics
Finished work at one school; no more patients scheduled
Transportation
No transportation for children
Transportation late or broke down
Transportation of trailer or mobile clinic
Weather
Preventing patients from coming to school or office
Causing late arrival of patients
Causing school to close early or keeping it closed all day
Causing late arrival of dentist
Conference and visitors
Supervisor's visits
Visits from other dentists, educators and so forth
Conference with health authorities
Attendance at state dental meetings
Health Education
Talks to classes
Showing motion pictures to classes
Conference with mothers
Maintenance
Trailer too cold for dental work
Cleaning or repairing equipment
Breakdown of equipment or discontinuance of power
Packing equipment for moving
Obtaining new equipment or parts thereof, or supplies
Consultation regarding new equipment
Others
Instruments stolen
School closing early for meeting of faculty, P.T.A. and so forth
Patients ill (measles, tonsillitis)
Illness of nurse responsible for scheduling and transporting patients
Orientation of new personnel to program
V-J Day celebration
Accidents to nondental staff, delaying dental work
Activities at school (chest roentgenograms, religious services, parties and so forth), delaying work

the lost time figures reported from clinic and mobile programs are more reliable than those obtained from private offices. When we see, therefore, in Table 5 that the percentage of nonproductive lost time was approximately the same for private office and clinic programs, we can assume that in all probability the percentage was greater in the private offices.

When the rate of completion of the various types of programs is considered, the most efficient administrative type is the mobile unit, and the least efficient, in terms of administration, is the private dental office. It must be realized, however, that at the time of preparation of this material New Jersey had in operation only three mobile units and that the operating dentists had been carefully selected. Because these dentists had been carefully selected the administrative picture would tend to be better than in those programs in which the dentists were private practitioners who had been selected because of the location of their offices.

In a private office the patients assigned to the dentist from the program are scheduled by appointment. If these patients do not arrive, this time is completely lost, since no other patient is available. In clinics and mobile units, the children usually are brought in groups from the school, and if a child is not present the dentist may work for a longer period on the other children. This allows prospective lost time to be turned into gainful operating time.

This procedure also may be employed in private dental offices, provided enough patients are accepted by the dentist from the program. The difficulty in applying this to private offices is that many practitioners are unwilling to accept a sufficient number of children from the program to enable their efforts to be used most efficiently. If the private dentists would accept more children, the absence of a child would not necessarily result in lost time, since a longer period

Table 8.—Summary of lost time analysis

Type of program	Total minutes	Administration		Transportation		Weather		Conferences and visitors		Health education		Maintenance		Others	
		Minutes	%	Minutes	%	Minutes	%	Minutes	%	Minutes	%	Minutes	%	Minutes	%
P. O.	17,165	14,575	84.9	360	2.1	1,920	11.2	80	0.5	80	0.5	—	—	150	0.8
C.	31,315	23,795	76.0	1,115	3.6	1,495	4.8	2,000	6.3	710	2.3	820	2.6	1,380	4.4
T. & M. C.	10,935	3,965	36.3	1,990	18.2	330	3.0	1,340	12.3	330	3.0	1,930	17.6	1,050	9.6
Total	59,415	42,335	71.2	3,465	5.7	3,745	6.3	3,420	5.7	1,120	1.9	2,750	4.5	2,850	4.7

P.O., private office; C, clinic; T. & M.C., trailer and mobile clinic.

could be spent on the other children present. Also, at the dentist's discretion, longer appointments could be scheduled, so that more work could be accomplished per visit, thereby reducing the possibility of lost time over an extended period of dental visits.

In considering the amount of money spent on nonproductive lost time, we must realize that the fact that less is spent on lost time in the mobile programs does not mean that they are the least expensive to include in a public health program for dental treatment. On the contrary, the mobile clinics are the most expensive to set up and equip, and the cost per child of operating in these units is also the greatest.[1] The amount of dentistry performed, however, more than justifies the expenditure, particularly when one considers the accessibility of these units to rural areas. Also, the fact that clinic and private office programs are administered less efficiently should not obscure the fact that these units are less expensive to set up and that each type is best suited for dental treatment under certain conditions.[1]

On breaking down the occurrence of all lost time by months (in the large programs), it was found that there was an increase in the amount of lost time in the latter part of June and a slight increase in the latter part of December. The June rise may be explained by the disorganized teaching schedule at promotion time and the eagerness of the children to start their summer vacation. The preparations which accompany the

Table 9.—Cooperation of local lay committees

Locale	Cooperation	Nonproductive lost time, per cent
A	Poor	8.1
B	Good	7.8
C	Fair	6.3
D	Excellent	4.3
E	Excellent	3.8
F	Excellent	15.1
G	Excellent*	4.1
H	Fair	13.7
I	Good	8.7
J	Excellent	3.4
K	Good	11.0
L	Excellent	13.4
M	Excellent	—
N	Excellent	0.3
O	Excellent	3.4
P	Excellent	18.8
Q	Good	3.3
R	Good	—
S	Good	9.4
T	Poor	5.0
U	Poor	—
V	Good	6.3
W	Excellent	0.5
X	Fair	4.4
Y	Good	1.6
Z	Excellent	5.2
AA	Poor	0.5

*Of the two rural clinics in this county, one receives much more cooperation from the lay committee than does the other.

approach of the Christmas season may account for the slight rise at the end of the chronologic year.

On the same basis allowances should be made during the summer months because of lack of definite school schedules. Because dental disease takes no vacation, we have endeavored to keep our programs going on a curtailed schedule through July and August. In this way, full time programs are reduced to half time, and patients who are most susceptible to dental disease are treated. One trailer is transferred to an indigent urban group at a summer camp to supply dental care.

From the evidence presented in the accompanying tables, it appears that the lost time incurred in program P (essentially during the summer months) can be reduced by decreasing the number of hours of working time during July and August.

The nontechnical phases of the treatment programs of the Division of Dental Health of the New Jersey State Department of Health are under the local supervision of the lay dental health committees.[10] Therefore, the efficiency of these local committees should reflect on the administration of the programs under their jurisdiction. In Table 9 an attempt was made to correlate the degree of cooperation of the lay committees with the percentage of nonproductive lost time (percentage of total dentist time). No definite correlation was maintained because of many other factors, such as proximity of the dental unit to the school and the attitude of the local principal and school nurses. It is here that a lost time analysis falls short of being a complete measure of the administrative factors in a public health program for dental treatment.

Conclusions

1. Lost time analysis is a valuable tool for measuring the efficiency of the administrative phase of a public health program for dental treatment.

2. From the administrative point of view, the most efficient treatment unit is the mobile one. The private office is the least efficient.

3. The human element must always be reckoned with in the consideration of any type of treatment program.—*Broad Street Bank Building.*

10. Wisan, J. M., Coordination of Dental Programs. *New Jersey Municipalities* (February) 1945.

Effects of Working at Night.—Work during the hours of night is neither ideal nor safe from the physical and psychological point of view. Body and emotions are much older than civilization and their activities are based on certain biologic cycles and rhythms. For millions of years night has been for sleep, day for work. In the past few decades we have tried to reverse this cycle. By doing so we have brought physiological and psychological disturbances. Beyond a certain limit the organism cannot stand these reversals without being liable to fatigue, apathy, irritability, lack of attention, or actual organic disease which follows prolonged periods of disturbed function.—*Philip J. Moorad, "Human Factors in Accident Liability," Indust. Med. 16:10, October 1947.*

A BACTERIOLOGIC CARIES SURVEY METHOD APPLIED TO PLANTATION CHILDREN

F. W. Hartmann, B.S., M.S., Sc.D., Honolulu

IMPROVEMENT of the health of children living in plantation communities has long been the concern of Nils P. Larsen, medical adviser of the Hawaiian Sugar Planters' Association. Under his direction an intensive study on the incidence of caries among these children was carried out in 1946.

The bacteriologic phase of the work, which also included medical and dental examinations, was based on the fact that aciduric bacilli are associated with the carious process in teeth. Whether or not such organisms, especially those of the genus Lactobacillus, are the sole or primary causative agents is a question which need not be dealt with here. Instead, it will be shown that Snyder's[1,2] colorimetric method for the measurement of acid production by micro-organisms in saliva is applicable to survey work on the incidence of caries.

Materials and Methods

Specimens of saliva were collected in sterile small widemouthed bottles equipped with plastic caps. The children were instructed to chew on paraffin pellets for about three minutes and to expectorate into the bottle provided by the nurse in charge. Specimens were collected between 9 and 11 a.m. or between 1 and 2 p.m. and stored in the refrigerator. Cultures usually were prepared the first day and always by the second day after collection. The first 126 saliva specimens were cultured by two methods, one method being a check against the other.

In the first procedure, 1 ml. of saliva was mixed thoroughly with 4 ml. of saline solution at pH 5.5. Then 0.1 ml. of the dilution was distributed uniformly over the surface of a tomato juice agar plate by means of a sterile bent glass rod, and the culture was incubated at 37.5±0.5 C. for four days. The medium employed was that of Kulp,[3,4] excepting that the final pH was reduced to 5.0 by the addition of lactic acid. The concentration of hydrogen ions was then the same as that of Jay's[5] medium. Sterilization was carried out in the autoclave at 121 C. for eight minutes. After incubation colonies of aciduric bacilli and of yeasts were counted, and the results were expressed in terms of colonies per milliliter of saliva.

In the second method, 0.2 ml. of saliva was added to 5 ml. of bromcresol green dextrose agar[4] at 45 C. Inoculum and medium were mixed, and the culture tubes were incubated at 37.5±0.5 C. for four days. This indicator medium has been recommended by Snyder[1,2] for the colorimetric estimation of lactobacilli. It has a pH of approximately 4.8, but can

---

Read in part at a joint meeting of the Territorial Dental Association, Honolulu County Medical Association and Territorial Association of Plantation Physicians, Honolulu, November 1, 1946.

Chairman, Bacteriology Department, University of Hawaii.

1. Snyder, M. L., A Simple Colorimetric Method for the Estimation of Relative Numbers of Lactobacilli in Saliva. *J. D. Res.* 19:349 (August) 1940.

2. Snyder, M. L., A Simple Colorimetric Method for the Diagnosis of Caries Activity. *J.A.D.A.* 28:44 (January) 1941.

3. Kulp, W. L., and White, V., A Modified Medium for Plating L. Acidophilus. *Science* 76:17 (July 1) 1932.

4. Manufactured by Difco Laboratories, Inc., Detroit.

5. Jay, P., Lactobacillus Acidophilus and Dental Caries. *Am. J. Pub. Health* 28:759 (June) 1938.

be autoclaved at 121 C. for fifteen minutes without harm. The color of each tube was noted, compared with an uninoculated control tube and recorded every twenty-four hours during the incubation period. The readings covered a numerical range from 0, the bluish green color of the uninoculated medium, to 4, a distinct yellow. Only colors 3 and 4, where green was no longer dominant, were considered to be positive, although the lesser color changes indicated by the numbers 1 and 2 were recorded.

The 126 saliva specimens previously mentioned were the first of a series of 629 collected from 321 children in eight different classes of three plantation community schools on Oahu. The pupils were in the first to ninth grades. In nearly every case samples were obtained from the child twice within a period of three months. The ancestries of the 321 subjects included Japanese, Filipino, Hawaiian, Caucasian, Chinese and mixtures thereof. The latter 503 specimens of saliva were evaluated by the colorimetric method only, and the results with medical and dental data were presented by Nils P. Larsen at the recent meeting of the American Medical Association.

Results

In Table 1 a comparison is made between estimates of aciduric bacilli by means of the plate and the colorimetric method on the same specimens.

Table 1.—Comparison of colonies of aciduric bacilli on tomato juice agar and of colorimetric determinations in bromcresol green dextrose agar

Colorimetric evaluation of saliva*	Colonies per milliliter of saliva			Subtotal colorimetric estimate
	0-99	100-9,999	10,000-999,999	
− 96 hr.	11			11
+ 72-96 hr.	4	9	3	16
+ 24-48 hr.	2	11	86	99
Total	17	20	89	126

* − denotes color 0, 1 or 2 (green dominant); + denotes color 3 or 4 (yellow dominant).

It will be noted that of the 17 specimens showing few (0-99) aciduric bacilli per milliliter, 11 were colorimetrically negative after ninety-six hours, 4 were positive after seventy-two to ninety-six hours, and only 2 gave a positive color change within forty-eight hours. Of 20 specimens containing a moderate (100-9,999) number of bacilli, 9 produced a positive color change on the third or fourth day and 11 turned positive on the first or second day. Eighty-six of the 89 specimens with a high count also proved to be strongly positive by the colorimetric test, as shown in the fourth column of Table 1. When the subtotals of specimens evaluated by both methods are compared, it becomes apparent that they are in approximate agreement at each of the three levels indicated.

Rosebury[6] has pointed out that although a culture medium containing agar and dextrose at pH 5.0 will permit growth of aciduric bacilli, yeasts, staphylococci, streptococci, micrococci and sarcinas, the bacilli and yeasts are the only organisms whose growth on this type of medium has been correlated in any way with caries. He has noted also that the correlation between yeast and caries is inconstant. Therefore, it was of importance to determine whether the colorimetric test used here was reflecting the number of yeast cells present in saliva as accurately as the number of acidogenic bacilli.

Table 2 provides a comparison between the yeast counts and colorimetric results on the same 126 specimens of saliva. Inspection of these data shows that 45 of 71 specimens which contained relatively few yeast cells nevertheless gave a strong colorimetric reaction. All but 1 of the 55 specimens with 100 to 9,999 yeast organisms per milliliter produced a positive color change in twenty-four to forty-eight hours. If the numbers of specimens

6. Rosebury, T., The Parasitic Lactobacilli. *Arch. Path.* 38:413 (December) 1944.

falling within each of the three levels determined by both methods are compared, no correlation is apparent.

When the numbers of specimens giving few, moderate and many yeast colonies are compared with the respective figures for aciduric bacilli (Table 3), no agreement can be found.

Discussion

Color changes of the bromcresol green are brought about principally by acid produced by aciduric bacilli, and the method provides, therefore, an indirect and approximate means of estimating the number of such organisms present in samples of saliva as well as of showing the total production of acid.

Snyder[1] has discussed adequately certain limitations which must be kept in mind when interpreting the results of the test. Although acid from any source can affect the color of the medium, it has been demonstrated that the test is not in any way an indicator of the number of yeast cells present. This is important in view of the fact that, as has been shown, no direct relationship exists between the numbers of aciduric bacilli and of yeasts in saliva.

Larsen has found that the results of the colorimetric test obtained on specimens of saliva from the 321 children previously referred to, agree well with the findings of the dental examiners. For instance, it has been determined that 88 per cent of 1,548 teeth of children with a low colorimetric score were free from caries, whereas only 66 per cent of 2,958 teeth of children with a high colorimetric reading were noncarious.

Table 2.—Comparison of colonies of yeast cells on tomato juice agar and of colorimetric determinations in bromcresol green dextrose agar

Colorimetric evaluation of saliva*	Colonies per milliliter of saliva			Subtotal colorimetric estimate
	0-99	100-9,999	10,000-999,999	
− 96 hr.	11			11
+ 72-96 hr.	15	1		16
+ 24-48 hr.	45	50	4	99
Total	71	51	4	126

* − denotes color 0, 1 or 2 (green dominant); + denotes color 3 or 4 (yellow dominant).

Table 3.—Comparison of colonies of yeast cells and of aciduric bacilli on tomato juice agar

Colonies of aciduric bacilli per milliliter of saliva	Colonies of yeast cells per milliliter of saliva			Subtotal aciduric bacilli
	0-99	100-9,999	10,000-999,999	
0-99	16	1		17
100-9,999	15	5		20
10,000-999,999	41	44	4	89
Total	72	50	4	126

The colorimetric test was devised and recommended for survey work on caries because of its practical advantages over plating procedures. Experience in Hawaii has shown that the colorimetric test gives results which closely approximate plate estimates of aciduric bacilli and agree well with dental findings, thus confirming its value for survey purposes.

Summary

A colorimetric method for estimating the numbers of aciduric bacilli in saliva has been employed in a survey study of the incidence of caries in children in Hawaii. The technic and apparatus are simple, and the results achieved agree well with those obtained by plating procedures. Comparison of data obtained by colorimetric means with the findings of the dental examiners indicates that this test reflects the extent of caries activity in a large group of children.

It has also been shown that the colorimetric test is not an indicator of the concentration of yeast cells in saliva, which varies independently of the aciduric bacillus count.

The conclusion is drawn that the colorimetric test is a valuable tool for use in surveys on dental caries.

PEDODONTICS AND ORTHODONTICS: A COMBINATION PRACTICE

Frank F. Lamons, D.D.S., Atlanta, Ga.

THE title of this paper suggests two recognized specialties of dentistry which may be practiced in combination. Such a combination can render an acceptable service with certain advantages to the patient as well as to the practitioner. It is my purpose to discuss such a combination practice as a desirable service which is acceptable to the practitioner's severest critics; namely, his patients.

Specialties in Dentistry

Specialties in dentistry are the natural outgrowth of the enlarged and ever widening service which the profession is offering to the public in the field of dental and oral health. The Council on Dental Education of the American Dental Association took recognition of this condition during 1944-1945, and as a result of its study defined a specialty in dentistry, listed the specialties worthy of present notice, indicated the nature of special training it deemed advisable and expressed its conviction concerning the recognition of specialists.[1]

The Council defines a specialty as follows:

> A specialty in dentistry is a field of practice which calls for intensive study and extended clinical and laboratory experience by a dentist beyond the training offered as a preparation for general practice in the undergraduate curriculum. The following branches of dentistry are recognized at this time as suitable fields for the certification of specialists: oral surgery, orthodontics, pedodontics, periodontia and prosthodontia.
>
> The minimum advanced educational requirement for the recognition of a specialist should be the completion of two years of advanced study in institutions approved by the Council.
>
> The certification of specialists in dentistry should be left to the specialty groups themselves through their national societies after the pattern of the recognized specialties in medicine.

It should be noted that the Council on Dental Education did not list radiodontia or endodontia as specialties, although they have been practiced as specialties of dentistry by noted dentists for many years. It also may be pointed out that combinations of exodontia and radiodontia or oral surgery and radiodontia have been recognized as specialties and practiced by prominent dentists for many years.

I do not believe that it was the intent or purpose of the Council to recommend the specialties they have listed as the only ones, nor do I accept their pronouncement as meaning that a combination of one or more of these specialties would be considered a breach of good faith. The service rendered by the practitioner ultimately will decide the combinations as well as the limitations of the services offered as specialties.

Specialties may be judged by the scope of the service they render, and this statement should be further enlarged to mean the quality of service which is rendered. Pedodontics and orthodontics in a combination practice may supply a quality of service which

Read at the eighty-eighth annual meeting of the American Dental Association, Boston, August 5, 1947.

1. Horner, H. H., *Dental Education Today*. Chicago: University of Chicago Press, p. 284.

cannot be challenged and may render this service without detracting in the least from the quality of that given by each as a separate specialty of practice.

Natural Divisions in Dentistry

In my opinion, there are two natural divisions in the practice of dentistry, which are based on the basic philosophy with which the problems of each division are approached. One is the practice of dentistry for children, or pedodontics, and the other is the practice of dentistry for adults.

In pedodontics the basic philosophy should be, and is, maintaining dental health and assisting the individual to grow and develop from an early age to maturity with optimum functional efficiency, health and desirable esthetic appearance.

In dentistry for adults the basic philosophy of practice can be only to maintain that state of health of the teeth which is present at maturity, or to put it another way, the repair, restoration and maintenance of conditions which have passed the stage of prevention. The philosophy could be stated still another way: Dentistry for adults encompasses the restoration and repair of teeth which did not survive the period preceding maturity during which prevention might have been practiced more successfully.

The division of dentistry for children encompasses that period of life up to the completion of the eruption of the full complement of teeth, even including the third molars. Usually dentistry for children is accepted to mean dentistry for the very young child. Such a narrow limitation restricts the full value of the service from the standpoint of patient benefits and may restrict the operator at a time when he can render a fuller and more understanding service because of his knowledge of early development of the individual's teeth. Orthodontics then, in reality, becomes a part of dentistry for children and is a part of bringing the person to maturity with the optimum in dental health, development and functional requirements,—yes, even all the benefits which dentistry has to offer as a health service.

The division of dentistry for adults, encompassing that period after maturity, is in its basic philosophy not concerned with the prevention of conditions leading to the abnormal growth and development of a healthy set of teeth and their associated parts. It must then resort to repair, restoration and maintenance of those conditions with which the person has reached maturity.

These natural divisions of dentistry may suggest two divergent schools of thought which govern the thinking and planning which each operator must put into his work. One is building for the future and the other is maintaining the present state of the teeth. In the first division the Council's specialties of pedodontics and orthodontics are to be found, and in the second, prosthodontia and periodontia may be listed, with oral surgery serving both groups.

It seems reasonable to believe that the division of the practice of dentistry into these natural groups is an acceptable tenet, one which may lend itself to discussion and the offering of certain suggested procedures of practice which point to greater benefits to the public and a wider distribution of the services offered by the specialists. The first suggestion naturally would be a greater number of dentists who are schooled in the basic philosophy of dentistry as a service which tends to bring persons to maturity with optimum dental health. This means more dentists devoting their energies to pedodontics and orthodontics.

The phenomenal growth of American dentistry during the last century has been in the division noted here as dentistry for adults. Repair and restoration have attracted the overwhelming majority of practitioners, and only within the last two decades has pedodontics appeared

on the scene with enough force to develop into a specialty. Public education in dental health has contributed to this recognition of pedodontics and also has produced proposed legislative measures which tend to offer services for children as their most appealing point. Any survey of the practice of dentistry today seems to point out the fact that not enough of the time of practicing dentists is given to children, and too much, proportionately, is given to adults, to make any noticeable change in the dental health conditions of the people. Too few men are being attracted to the field of pedodontics, consequently much is being said and written about the fact that the general practitioner should pay more attention to the needs of children. There must be a reason why more dentists do not specialize in pedodontics. The answer is obvious. Economically, dentistry for children is not as remunerative as dentistry for adults, and the financial reward cannot compete with that received for the various prosthetic appliances which are fabricated largely in commercial laboratories.

Distribution of Pedodontic Service

There must be a greater distribution of pedodontic service on the specialist's level to meet the ever increasing public demands. If economics is a handicap, then pedodontics and orthodontics can be an answer. The practice of orthodontics as a specialty for many years has proved to be economically advantageous, but the fact that orthodontists as a rule are located in the larger population centers restricts the distribution of their services. Economically the combination of pedodontics and orthodontics into one specialty of practice is sound and practical. Such a combination can mean that services may be spread to reach a far greater percentage of the population than now is being served. Smaller communities can support this type of specialization to a decided advantage for the public as well as for the dentist.

Marcus L. Ward[2] of Ann Arbor, Mich. expressed this sentiment very clearly. He stated,

> I agree to the fullest extent that so-called children's dentistry should be combined with orthodontics in both teaching and practice. We are witnessing a campaign by the medical profession to get general practitioners to go to much needed communities because the fifteen specialties of medicine have reduced the number of general practitioners needed to care for the people. Dentistry is following the same course and is developing more specialties than is in the interest of the people, who are getting tired of being sent around to several places to get comparatively simple service. Overspecialization is the best evidence that advocates of national health programs want, to show the fact that the profession is not focusing its attention upon service to the masses.

Ward further stated,

> Although the specialties are always responsible for the development of a given service to a high level, they are almost always disinterested in the distribution of their service. In fact, some of them insist upon restricting general service by prohibiting such combinations as pedodontics and orthodontics. This cannot continue in a world which is becoming social security minded, with health a major factor in all social security programs and with children a focal point in health service.

Training for Specialization

A greater distribution of services might be the first reason for advocating a combination of specialties, but patient benefits from a combination of pedodontics and orthodontics can be of even greater value. Both specialties must deal in a very large measure with the growth and development of the individual. An understanding of the changes taking place in the growing child from very early in life to maturity is essential, whether one is limiting his practice to pedodontics or orthodontics. Since this

2. Ward, M. L., Personal communication to the author.

parallel exists, it may be pointed out that basic training for both specialties is essentially the same. That more knowledge along these basic lines is not given in undergraduate training is regrettable. Too much of undergraduate curriculum is devoted to repair and restoration and not enough to aiding nature to develop to maturity a sound, well functioning set of teeth. The first thing a freshman dental student is taught to do is to make a set of false teeth. He begins his training with restoration instead of with preservation. A change in this procedure is most desirable and necessary, and dental educators should act to make this change.

Since basic training for specialization in pedodontics and orthodontics is essentially the same, the additional training necessary to equip the practitioner to render both services should be a minor factor in preparing men for practicing the combined specialties. I would not have anyone infer from my remarks that I favor inadequate training without sufficient background in either field, but I do wish to emphasize that with the proper basic training in growth and development and in those allied subjects which necessarily associate themselves with such training, the student is equipped to secure the additional knowledge in pedodontics and orthodontics which will make him efficient in a combination practice.

I am quite sure that the successful practice of pedodontics requires an appreciable understanding of the processes of growth and development. Such knowledge enables the practitioner to plan for the future and to perform services which will aid the individual in normal development, thereby offering a preventive service when abnormal development is apparent. Such a service requires the close observation of growing mouths beginning early in life. Children do not visit the orthodontist during the very early years, but they do visit the pedodontist.

The child's first visit to the dentist should be during his second year. Thereafter his visits should be regular, either two or three times a year, depending on his individual requirements. Observation of developing occlusion through its various stages is just as important as watching for the appearance of carious lesions. Simple interference when abnormal development is noted often may prevent a serious malocclusion in later years. This service is within the province of the pedodontist and usually is referred to as preventive orthodontics, but it is orthodontics just the same. Claude W. Bierman[3] of Minneapolis referred to this as "dental guidance." He stated,

> It is sensible to believe that when a child is seen at 18 months and periodically thereafter, we do have a better chance of guiding that mouth to maturity with a desirable occlusion than when we see the child at 12 or 14 years of age to start orthodontic treatment.

I do not wish you to infer from this quotation that orthodontic interference at an early age is always desirable. Early observation is desirable and promotes a better understanding on the part of the dentist as to just what constitutes a developing abnormality, thus enabling him to differentiate those conditions which may look abnormal but are just phases of normal development.

One of the most important factors in orthodontic procedures is to be able to pick out the most advantageous time to treat. This can be done best by one who has had the child in charge throughout his dental life. There are many variations in the time of eruption of the deciduous teeth and more variations in the time of exfoliation of and replacement by the succeeding permanent set. There also may be variations in the occlusal relations of the teeth. Occlusion for a 3 year old child is vastly different from that of a 7 year old, and the picture changes at succeeding age levels to become very

3. Bierman, C. W., Personal communication to the author.

different from a previous age level. These age levels refer to developmental periods which also have a wide individual variation. One might say that each child presents his own normal, and this normal can be determined only when one has observed the child for a time or has observed large numbers of children. The pedodontist is schooled to watch these and many other factors. One of the great values of observing a child throughout his early life cycle is that, after long experience, the dentist can anticipate developments which are the result of growth.

The average dentist does not enjoy working for children and often neglects them. When the position of a tooth or teeth seems to be extremely abnormal, he sometimes will refer the child to the orthodontist, who may know nothing about the history of the condition. The pedodontist, trained in the observation of growth and development, is in a better position to understand normal occlusion at different age levels. He must take into account the physiologic and developmental age, with due regard for changes which will follow, but even so he is in a better position to follow through with any orthodontic treatment which may be necessary. The patient herein becomes the beneficiary, and dental service reaches a higher mark.

The practice of pedodontics does not involve only the filling of teeth. It includes watching all changes and development as a whole. This is aptly expressed by Mary M. Moore[4] of Philadelphia.

> The one idea I seem to have on the subject of the need for orthodontics being practiced by the general children's dentist is that specialization is likely to narrow the outlook of the specialist. In children's work the most important single factor is the concept of the child as a whole unit, not just a mouth compounded of a mandible, maxilla and some teeth. If some of the dentists practicing orthodontics were also responsible for having some teeth left when the orthodontics is completed, they would be more conscious of the need for control of caries, would develop appliances which could be kept clean, and *probably* (?) would know, after a while, that all mouths do not need orthodontic appliances.

4. Moore, Mary M., Personal communication to the author.

Preventive Orthodontics

There is another approach to the problems of preventive orthodontics which is worthy of discussion. Among the various etiologic conditions which contribute to causing malocclusion are mentioned such things as premature loss of the deciduous teeth; prolonged retention of deciduous teeth; supernumerary teeth; missing teeth, both in the deciduous and permanent dentition; abnormal habits, and poor dentistry. One very disturbing factor is the early loss of the permanent first molar. These, in addition to abnormal developmental conditions, constitute a wide variety of conditions to which malocclusion is attributed. There seems to be some controversy with regard to definite etiologic factors, but enough has been proved to state with certainty that many of the etiologic factors in the production of malocclusion could have been avoided with better attention to pedodontics by the profession.

Brandhorst[5] pointed out the necessity of more careful attention to the deciduous teeth. In a table entitled "Frequency of occurrence of various etiologic factors in dento-facial deformities," he divided his findings into controllable and questionable groups. In the controllable group the percentage of findings was 81, as compared with 19 per cent in the questionable group. A further breakdown of the figures in the controllable group showed the percentage of premature loss of teeth to be 37. Nineteen per cent of patients showed prolonged retention of deciduous teeth. His comments about the

5. Brandhorst, O. W., Promoting Normal Development by Maintaining Function of the Deciduous Teeth. *J.A.D.A.* 19:1196 (July) 1932.

significance of these figures are even more interesting. He said,

When we realize our responsibility in this matter, there is reason to shudder. We have been derelict in our duty and our obligation to the public. Think of it! About three-fourths of the abnormalities we see could have been averted if we had done what the public had a right to expect of us. As a profession, we must assume our full responsibility in prevention as well as in treatment.

Crosby[6] stated,

Probably 60 per cent or more of the cases which come into our hands are complicated by poor dentistry, lack of knowledge of the value of early prophylactic care and filling of the deciduous teeth while the cavities are small, the judicious polishing out of decalcified spots, the application of silver nitrate when indicated, etc.

I do not question the correctness of the percentages given in the foregoing quotations. They have been published, frequently are quoted and, as far as I am able to determine, have not been refuted. Although one may not wish to accept them, no one will dispute the fact that a large percentage of malocclusions may be attributed to inadequate care of the teeth of young children, as well as of young adults before they have finished growing. A combination practice of pedodontics and orthodontics certainly would go a long way in reducing the percentages just quoted. Again, the patients become the beneficiaries, and dental services reach a higher mark.

The permanent first molar has been recognized as one of the most important teeth in the dental arch. It has been referred to as the "keystone of the dental arch." Hyatt[7] and numerous others have shown the importance of this tooth and have suggested methods and procedures for its preservation. Generally speaking, this means the recognition of its importance and early care, with the filling or polishing out of all defects in the enamel structure.

Salzmann[8] has studied the problems presented by the loss of this tooth, and his conclusions seem accurate and reliable. He set up his study as follows:

Full upper and lower dental impressions were taken and casts made of 500 cases in boys and girls, 15 to 19 years of age, who were found to have had from one to four first molar teeth extracted. An additional group of boys and girls in the same age range who had not lost any of the first molars was also studied for purposes of control and comparison. Altogether, 1,000 cases were studied, embracing the various ethnic, economic, social and intellectual components found in the school population of Greater New York.

This setup is given to point out the reliability of his study. His conclusions state:

The harmful effects following extraction of first permanent molars are well-defined in adolescent boys and girls nearing the final stages of growth and development . . . The effects of first molar extraction are manifested in the increase in caries, occlusal disturbances and changes in facial contour and appearance and frequently in interference with speech and general physical growth and development. The fact that the average boy and girl at 15 years has had almost two of his first molars extracted is additional proof that periodic dental examination and treatment when necessary must start as soon as the teeth erupt. The havoc initiated in the dentition as a whole by the extraction of the first permanent molar teeth without some provision for space maintenance for the preservation of the occlusal relationship is a fact that must be recognized, publicized and prevented by the practicing dentist.

I am in hearty accord with the findings of Salzmann. From an orthodontic point of view the loss of a permanent first molar is tragic. More attention, leading to the preservation of these teeth, will, I am sure, meet with the hearty approval of members of the dental

6. Crosby, A. W., To What Definite Causes May Malocclusion and Its Attending Oral and Facial Abnormalities Be Attributed? *Internat. J. Orthodontia* 18:
7. Hyatt, T. P., *Hygiene of the Mouth and Teeth*. Brooklyn: Brooklyn Dental Publishing Co., 1929.

8. Salzmann, J. A., A Study of Orthodontic and Facial Changes, and Effects on Dentition Attending the Loss of First Molars in Five Hundred Adolescents. *J.A.D.A. & D. Cosmos* 25:892 (June) 1938.

profession. Again, I would like to point out that the combination practice of pedodontics and orthodontics, by creating a wider distribution of services in these fields, would tend to relieve in a large measure the conditions pointed out by Salzmann.

Need for Pedodontic Services

Nash[9] had this to say:

> There are seven hundred and eighty-four United States members of the American Society of Dentistry for Children. This membership is made up of general practitioners, pedodontists, orthodontists, dental educators, researchists, those in the United States Public Health Service, and a few unusual pediatricians. I am advised that of this membership there are approximately seventy who limit their practice to pedodontics. It is estimated by the Secretary of the Society that not more than seventy-five men in the country in addition to these limit their practice to pedodontics. Thus, we have an estimate that 125 dentists out of 70,000 may be limiting their practice to pedodontics, percentage wise that amounts to 0.001785.
>
> It seems that in a country with 38,792,480 persons between the ages of 2 and 18 years, maybe there should be a greater number of dentists practicing children's dentistry exclusively.

Nash's deductions may be accepted as logical. His figures would tend to show that there is 1 pedodontist for each group of 310,339 persons between the ages of 2 to 18 years. What is the situation in orthodontics? There are approximately 1,400 dentists limiting their practice to orthodontics. Using Nash's same age group of 2 to 18 years, consisting of 38,792,480 persons, the ratio is 1 orthodontist to each 27,709. It should be evident that in the interest of better service for children the ratio of pedodontists to orthodontists is out of proportion. Perhaps the combination practice would serve to balance this ratio.

Nash further stated:

> Orthodontics was developed as a specialty very largely because strong and vigorous-minded men took it up and developed it. Orthodontics and orthodontists have long been leading elements in the dental profession. They have also been deeply and closely associated with the treatment of children. *Good orthodontic practice can only exist to the degree that it is supported by good children's dentistry.*

Although Nash did not advocate a combination practice, I am sure he would agree that there is much to be said in favor of the combination of pedodontics and orthodontics into one specialty of practice.

Personal Experience

For more than twenty-one years I have conducted a combined practice with a great deal of personal satisfaction. I was encouraged in this direction by the late Thomas P. Hinman of Atlanta, Ga., with whom I began my dental career and was associated in practice for more than six years. He believed the combination had many advantages.

I have personal acquaintance with several other practitioners to whom the combination of pedodontics and orthodontics has proved economically sound, and it has given to them, because of the services rendered, the same degree of personal satisfaction.

In my practice I have seen many children reach maturity, with excellent natural dentures and with all of the thirty-two teeth in good occlusion. They have had prophylactic care, and the majority of them have had simple fillings. A few larger fillings have been necessary. These children have received a degree of education in the importance of dental health and have learned to appreciate regular attention. In many instances, simple orthodontic corrections have been made, which allowed later development to produce normal occlusion. I feel that my experience justifies my recommendation of a combination practice.

9. Nash, F. W., Children's Dentistry and the Orthodontist. *Am. J. Orthodont. & Oral Surg.* 33:74 (February) 1947.

I have found it necessary to divide my practice so that operative procedures are taken care of during the morning hours. This seemed advisable because of the more frequent office visits which the orthodontic patients make. It seemed unwise to keep them out of school and favor the operative patients, who make comparatively few visits during the year.

I also would like to add here that the services of a capable hygienist have enabled me to keep up a better routine with patients who require observation and particularly with those who showed evidence of developing malocclusions. This service with the routine prophylactic services, I feel, has greatly benefited my patients.

Summary and Conclusions

Pedodontics and orthodontics are recognized specialties in the practice of dentistry which can be combined in one practice with decided advantages to the practitioner and the public.

Natural divisions of the practice of dentistry into dentistry for children and dentistry for adults seem to indicate that pedodontics and orthodontics, both falling in the division of dentistry for children, have the same basic philosophy of bringing to maturity a sound, well functioning set of natural teeth.

Advanced training for pedodontics and orthodontics is essentially the same in that it is largely concerned with growth and development.

There is great need for more pedodontic service in American dentistry; that it is not given probably is due largely to the fact that economically it is not as attractive as other types of practice. Orthodontics is attractive from an economic point of view, and a combination of pedodontics and orthodontics can mean that both will be economically sound and attractive. This would tend to offer a wider distribution of these vital health services, with decided advantages to the patient.—*478 Peachtree Street.*

Industry as a Profession.—There is no sharp line between the professions and the industries. A hundred years ago the trade of teaching, which today is on the whole an honorable public service, was rather a vulgar speculation upon public credulity; if Mr. Squeers was a caricature, the Oxford of Gibbon and Adam Smith was a solid port-fed reality; no local authority could have performed one-tenth of the duties which are carried out by a modern municipal corporation every day, because there was no body of public servants to perform them, and such as there were took bribes. It is conceivable, at least, that some branches of medicine might have developed on the lines of industrial capitalism, with hospitals as factories, doctors hired at competitive wages as their "hand," large dividends paid to shareholders by catering for the rich, and the poor, who do not offer a profitable market, supplied with an inferior service or with no service at all.

The idea that there is some mysterious difference between making munitions of war and firing them, between building schools and teaching in them when built, between providing food and providing health, which makes it at once inevitable and laudable that the former should be carried on with a single eye to pecuniary gain, while the latter are conducted by professional men who expect to be paid for service but who neither watch for windfalls nor raise their fees merely because there are more sick to be cured, more children to be taught, or more enemies to be resisted, is an illusion only less astonishing than that the leaders of industry should welcome the insult as an honor and wear their humiliation as a kind of halo. The work of making boots or building a house is in itself no more degrading than that of curing the sick or teaching the ignorant. It is as necessary and therefore as honorable. It should be at least equally bound by rules which have as their object to maintain the standards of professional service. It should be at least equally free from the vulgar subordination of moral standards to financial interests.—*R. H. Tawney, The Acquisitive Society. New York: Harcourt, Brace & Company, 1920 (1946 printing).*

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

JANUARY 1948 • VOLUME 36 • NUMBER 1

LON W. MORREY, D.D.S., *Editor*

Published by the American Dental Association • 222 East Superior St. • Chicago 11, Ill.

EDITORIALS

1948:

YEAR OF ACHIEVEMENT

THE coming of a new year seems to have a peculiar impact in a time when the rubble of the second world war lies still untouched and when the armament for another world conflict is being rushed to the drawing boards. In such a time, the dismissal of an old year often carries with it the notion that opportunity for a new start is automatically provided. The realist knows, however, that the year grows out of the months that have preceded it; that the pattern of the old months will continue to grow and expand.

The year of 1948, then, will be little different from the ones that preceded it. A little more intense, perhaps, and a little more comforted by a peace not yet broken, it will confront the old unsolved problems of 1946 and 1947. But it would be a negation of what the new year has come to mean traditionally in this country to say that there will be no enlarged areas in which courage, industry and common sense can be productively exercised.

It is to the unsolved tasks of the old year that the new year should be dedicated. Unless all signs fail, these are still many. The building of a sound economy, the encirclement of the great social problems, the strengthening of good will everywhere and the preservation of the peace will utilize all of the cunning, effort and luck that 1948 can muster. It is THE JOURNAL'S hope that 1948 will be a year of achievement in these fields and that in this progress to a steadier world, the members of the profession, as citizens and dentists, will take a proper part.

SCIENTIFIC APPROACH TO CONTROL OF CARIES

A WORKSHOP for obtaining an appraisal of the technics available to control dental caries is reported on page 3 in this issue of THE JOURNAL. It was sponsored by the School of Public Health of the University of Michigan as an in-service training course during the second week in September. None of the planning committee could predict in advance that the workshop technic, largely confined to the education of groups of teachers in the past, would serve in one week to crystallize opinion and assure a critical appraisal of information.

As the planning proceeded for this conference, the activity appeared more certain to provide a laboratory experiment for precipitating out the valid facts about the mechanism of the caries process and the control of this process. It promised, in addition, to bring together in a productive situation a number of the outstanding workers in caries research from the National Institute of Health and the universities and memorial clinics of this country. It offered an opportunity for the pooling of research experience and knowledge from many sections of North America. With the aid of statistical, library and research consultants, it seemed to present a device for getting the participants to evaluate the facts critically and to note the areas requiring further research. Finally, there was no doubt that the conference presented an opportunity to test the workshop technic in a scientific field of dental practice as an educational challenge for all of the participants—the "students," the research consultants and the other consultants.

The lag that exists between the discovery of scientific information by research activities and the dissemination of research findings to the profession generally for utilization by the busy practitioner of dentistry is well known. It has been said that "basic research constitutes the life blood of the profession." Many, however, will agree that of equal importance is the rapid dissemination of new information. The continual dissemination of new and accurate information, in fact, is the prime reason for postgraduate education in the health sciences. It should constitute one objective, always, in any consistent dental health education program.

Any scientific hypothesis deserves to survive only when verified by fact, and any unscientific hypothesis deserves to die as soon as it is found invalid. It is difficult to envision a true scientist who knowingly would attempt to preserve a poorly conceived hypothesis by becoming a martyr for a hasty statement. The true scientist forgets his preliminary reports and his once intriguing hypothesis and turns abruptly to something new and more productive. Much of this point of view pervaded the caries workshop, and those persons who have made statements without substantiating data, those who "believe" rather than "conclude," were given short shrift. It appears that some of this viewpoint may have activated the Research Commission in 1938 and 1939 when it collected reports of research activities as a preliminary step in the evaluation of information regarding dental caries.

Numerous articles have been printed within the last ten years which began, "We do not know the cause of dental caries." The authors then continued learnedly but unconvincingly to lecture the profession and the public on the proper means

to assure protection from the ravages of this disease, whose cause is unknown. For the preservation of the teeth people have been advised to utilize vitamins, calcium, phosphorus, proper mineral balance, chewing gum, fluorides, synthetic quinones, antibiotics, ammonia, urea, mouthwashes, dentifrices, toothbrushing, alkaline-ash diets, milk diets, detergent diets, protein diets, uncivilized diets, sugar-free diets and adequate diets, or to live an emotionally stable existence. The advice has depended on the bias of the writer. Many writers appear to be familiar with the original scientific work of W. D. Miller in Koch's laboratory, nearly fifty years ago. This research resulted in a report on the cause of dental caries, the so-called chemico-parasitic theory of tooth decay, which contributed so largely to the initial scientific prestige of dentistry as a profession. Some writers appear familiar with the observations of G. V. Black which followed. Relatively few writers appear familiar with the research work of more recent investigators which has established Miller's early theory as a fact.

From the workshop's evaluating committee on the mechanism of the caries process has come the decision that we know the cause of dental caries: "Dental caries is caused by acids resulting from the action of micro-organisms on carbohydrates, is characterized by a decalcification of the inorganic portion and is accompanied or followed by a disintegration of the organic substance of the tooth." Conclusions based on present day evidence have been achieved similarly by five other evaluating committees. They cover the relation of caries to systemic conditions, the effectiveness of prophylaxis and home care of the teeth, the use of fluorides and silver salts, the relation of vitamin and mineral ingestion and the contribution made by various types of diets in the control of caries.

As more and more investigators add, step by step, to the store of valid data concerning the process of caries, immunity to it and the control of it, a continuation of evaluating workshops may be recommended strongly. The participants in the September workshop were enthusiastic about the appraisal and educational situation which this type of experience provides. At once initial workshops could be promoted profitably for the evaluation of the facts about gingival disease and its control, about occlusion and the interception of malocclusion and about oral and systemic interrelations, for example, the present status of scientific information regarding oral focal infection. Technics are available to replace conjecture with fact.—*K. A. E.*

THE PROPHYLACTIC VALUE OF SODIUM FLUORIDE

THE topical application of sodium fluoride to the teeth of children appears to be the most practical method known to inhibit dental decay. Studies by Knutson and Armstrong[1] and Bibby and others[2] indicate that this treatment, if properly applied, may produce a 40 per cent reduction in the incidence of caries.

A satisfactory technic for applying the solution is outlined by Knutson on page 37

of this issue of THE JOURNAL. Dentists who wish to introduce this prophylactic measure into their practice are urged to follow carefully this technic.

During the early years of this century, oral hygiene was hailed as the panacea for dental decay. The profession assured the public that the incidence of caries could be reduced by brushing the teeth thoroughly and often. In spite of this advice, caries continued to occur in the mouths of the most fastidious. The slogan, "A clean tooth never decays," lost caste, and the public lost confidence in this preventive advice. Next came the era of nutrition in which a wholesome, well rounded diet was recommended to prevent dental decay. But despite vitamins and minerals, caries continued unabated. Although the dietary advice given by dentists was beneficial from a general health standpoint, it had little effect on the incidence of decay so long as the carbohydrate intake of the patient remained high. Efforts to prevent caries by dietary measures were not successful, and the confidence of the public again was shaken.

Dental researchers have now given the profession a method that will inhibit, to an appreciable extent, the incidence of caries in the teeth of children. However, it is the responsibility of every dentist who employs sodium fluoride as a prophylactic measure to use it correctly. The technic is not difficult, but it does require time, skill and patience. It is the responsibility of the dental profession to inform the public that the topical application of sodium fluoride will not inhibit caries entirely but that it will prove effective in many instances. The dental profession must proceed cautiously in using this latest prophylactic measure and in extolling its virtues to the public. We cannot afford another failure.

1. Knutson, J. W., and Armstrong, W. D., Effect of Topically Applied Sodium Fluoride on Dental Caries Experience. III. Report of Findings for the Third Study Year. *Pub. Health Rep.* 61:1683 (November 22) 1946.
2. Bibby, B. G.; Zander, H. A.; McKelleget, Mary, and Labunsky, Bertha, Preliminary Reports on the Effect on Dental Caries of the Use of Sodium Fluoride in a Prophylactic Cleaning Mixture and in a Mouthwash. *J. D. Res.* 25:207 (August) 1946.

NEW REGIONAL PUBLICATION:

NEW ENGLAND DENTAL JOURNAL

THE first issue of the *New England Dental Journal,* which appeared at the start of the new year, marks a significant step in dental journalism. For a long period, the quantity and quality of dental publications have been of serious concern to many commentators. The facilities and resources necessary to improvement are not frequently at hand, since many hold the view that publications, unlike other enterprises of dental organizations, must be self-sustaining. As a result of this attitude, considerable attention has been given to the concentration of facilities in a particular region so that dental journalism might be improved through the combination of resources.

New England lends itself admirably for an experiment in regional journalism. Perhaps more than any other area of the country, the New England states are bound together by staunch tradition and common history. Problems, social and professional, are more closely related in the New England states than in any other six

states of the union. The region has long supported an outstanding medical journal. The dentists of New England, for several years, have met annually at regional conferences to discuss their common problems. With such a background, the future of the new journal is auspicious.

The *New England Dental Journal* is supported by Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. It has absorbed the *Massachusetts Dental Journal,* long an outstanding publication in its own right, but some of the other states will continue to publish bulletins devoted mainly to local problems and local needs. Each state will have a voice in the management of the publication which, of course, will draw on the whole of New England for scientific material.

The establishment of this publication foretells much about the effort and cooperation that are so necessary for the solution of future problems. The *New England Dental Journal* cannot help but be a strong advocate for the advancement of New England dentistry. It will serve as the proving ground for the assertion that regional journalism will aid, and not impair, dental publications designed to serve more limited areas. The enterprise of the dental societies of New England is to be commended and THE JOURNAL wishes for its young contemporary a vigorous and productive career.

INTERNATIONAL CORRESPONDENCE

News From Great Britain

The Late Sir Norman Bennett

Sir Norman Bennett, who died on September 14, 1947, will be remembered for his interest in the welfare of the dental profession and his service to the British Dental Association. The book *Science and Practice of Dental Surgery* which he edited and which has a place in the professional libraries of most dental practitioners in Britain will be a constant reminder of his contributions to scientific dentistry and dental teaching. Since the book is no longer entirely up to date its influence has declined, but for many years it held first place as a statement of British practice in dentistry.

Bennett qualified in dentistry at the Royal Dental Hospital in 1894 and was graduated in medicine from Cambridge in 1896. In 1907 he became secretary of the British Dental Association, a position which he held for six years. During this period the problem of the standards of the practice of dentistry by some of the unqualified practitioners had arisen and there was, as a consequence, growing dissatisfaction with the Dentists' Act of 1878. The year after Bennett took office William Guy of Edinburgh advanced definite proposals for an amendment to the Act, and by 1911 the British Dental Association had prepared a referendum on a bill prepared for presentation to Parliament. Bennett had much to do with this referendum. In 1917 a Departmental Committee on Dental Practice was established. By that year Bennett had been chairman of the representative board of the British Dental Association for five years. Montague Hopson and he were given plenary powers by the association to deal with legislation in their evidence to the Departmental Committee. After the committee's report Bennett played a major role in the establishment of the Dentists' Act of 1921. After the passage of the Act he was disappointed to find that much hostility existed in certain quarters to the inclusion of the unqualified practitioners in the membership of the British Dental Association. At the beginning of this year he had the satisfaction of seeing the membership of the association opened to all on the Dentists Register. When the British Dental Association celebrated its fiftieth anniversary he was the obvious choice for president and in the same year, 1930, he was knighted by the King.

Annual Clinical Meeting at Bristol

The annual clinical meeting of the Bristol Dental Hospital was held on October 11. A large number of former students and local practitioners attended. Members of the staff gave demonstrations on intra-osseous analgesia, penicillin therapy in oral surgery, impression technic, oral surgery, gingivectomy, clinical cases, three quarter crowns and orthodontic treatment and appliances. Those who attended had an opportunity to meet the new professor of dental surgery, Arthur Darling. In the evening a dinner was held in honor of George Fawn, who has retired from the position of lecturer in dental surgery and from clinical teaching in the dental hospital.

Bureau of Postgraduate Instruction

It may be remembered that the Dental Board of the United Kingdom received recently a report from the committee that it formed some time ago, the Joint Advisory Committee on Postgraduate Dental Education. As a direct result of the recommendations of this report, it is announced that a Bureau of Dental Postgraduate Information has been established at 44 Hallam St., London, W.1. Brigadier R. A. Broderick has been appointed as the director.

Brigadier Broderick practiced in Birmingham before the war. He was lecturer in dental bacteriology in the University of Birmingham and held the appointments of dental surgeon to the Children's Hospital, to the Ear, Nose and Throat Hospital and to the Selly Oak Hospital. He succeeded Brigadier Harry Stobie in 1944 as consulting dental surgeon to the Army. Therefore he brings a wide clinical and administrative experience to help in the establishment of this important new office.

Information will be available on all the courses of instruction in Britain which are open to students at home and overseas. The Bureau will be in a position to supply information to the dental schools and teaching hos-

pitals on the general trends of inquiries so that programs can be prepared to suit the needs of the students. It is hoped that the Eastman Dental Clinic in London ultimately will be established as a dental postgraduate school.

Oral Surgery Club

The most select dental club in Britain is the Oral Surgery Club, which has a membership limited to forty. In September the members of the club commenced their postwar activities with a visit to Utrecht, Holland. The party of fifteen which left London on September 4 included Brigadier Broderick, consulting dental surgeon to the Army; Professor Hitchin, Dundee; A. M. Nodine, London; Adam Cubie, Glasgow; T. Jackson, Cheltenham; E. A. Hardy, London, and R. Sutton Taylor, senior dental surgeon at the Westminster Hospital, London, who is secretary of the club.

The following morning J. W. A. Tjebbes demonstrated cases of cleft palate with patients in the preoperative and postoperative stages. In the afternoon he operated on several of these patients and demonstrated his method. In all cases the premaxilla is preserved, and of particular interest to dentists was the fact that there was practically no resulting deformity of the dental arch. The next morning was spent in visiting the dental school and the school of anatomy at Utrecht. Professor F. C. Wilkinson, Dental Hospital, Manchester University, is the president of the club for the forthcoming year.

Public Dental Service Association Meeting

The annual general meeting of the Public Dental Service Association was held in London on September 20. Cyril W. Spendelow, L.D.S., was inducted as chairman for the ensuing year. Mr. Spendelow is in practice at Grimsby, where he is also honorary dental surgeon to the Grimsby and District Hospital. In his opening address, he gave, I think, a fair statement of the general feeling of the general practitioners throughout the country regarding the forthcoming National Health Service in terms of the information at present available. (The regulations governing the conditions of service have not yet been submitted to the House of Commons, so there is as yet no really authoritative information on which to base an opinión.)

Mr. Spendelow pointed out that it is indicated that, inasmuch as some forms of treatment will require an estimate to be submitted and approved before the treatment can be carried out, dentists are to lose a large measure of freedom of clinical judgment. In this he sees a possible disturbance in the patient's trust of the practitioner and in the practitioner's responsibility to the patient. Under the present National Health Insurance Scheme, there are plenty of instances in which "owing to the tactlessness of some Insurance Society official, seeds of an entirely unjust suspicion are sown in the patient's mind." He went on to say that "it is obvious that in any scheme sponsored and paid for by the state there must be safeguards and some measure of control of expenditure of public money, but I submit that control should be of such a sort that it would be deemed preferable to let a few guilty escape for the time being rather than that the innocent should be penalized. It may be objected that by taking this line some patients will, for instance, lose teeth that might have been preserved, but in the long run I feel sure that Pilate's dictum 'It is expedient that one should suffer for many' will prove the wiser course in this case at any rate."

Later he said that with regard to the methods of remuneration he felt that salaried dentists may tend to become civil servants of the worst type and do only enough work to hold the job. He spoke in favor of grants-in-aid. There are some definite advantages in the proposed service, and none is more to be praised than the stimulus that it will give to postgraduate education. Every general practitioner will welcome the opportunity to keep up to date in his practice of dentistry by attending postgraduate courses. The nationalization of the hospital services should also give dentistry additional aid.

Correction

In the news letter in the November 15 issue of THE JOURNAL, page 729, it was stated that James Aitchison, new director of the Dental Hospital in Glasgow, is joint author of a book on dental anatomy. Dr. Aitchison is joint author of a book on dental histology; his book on dental anatomy is entirely his own work. —*John Boyes, University of Durham, Newcastle Upon Tyne, England.*

A. D. A. AFFAIRS

JOURNAL BEGINS MONTHLY PUBLICATION IN JANUARY

Beginning with this issue, Vol. 36, No. 1, THE JOURNAL will be published monthly instead of semimonthly. The monthly issue will carry the same amount of scientific material as was formerly carried in the two issues a month. No change in format is contemplated.

The index of THE JOURNAL will be published semiannually as formerly. The index for July 1 to December 15, 1947 will be available about February 1, 1948.

ASSOCIATION OFFERS CORRECTION SERVICE FOR DENTAL DIRECTORY

In response to numerous requests for corrections in the *American Dental Directory,* and in order to keep this book up to date, a correction service will be available monthly beginning in January 1948. Approximately 10,000 corrections, as well as deletions and additions, will be included in the first issue.

Dentists, physicians and dental laboratories and other institutions who are interested in receiving this correction service are asked to write to John J. Hollister, Business Manager, American Dental Association, 222 E. Superior St., Chicago 11, for information.

The Association is appreciative of notifications of errors in the present directory.

ASSOCIATION MAILS 1947 SEALS TO OBTAIN RELIEF FUNDS

Continuing its policy of distributing Christmas seals in support of the relief fund, the American Dental Association recently mailed its 1947 seals to member dentists. The relief fund is maintained only through the sale of these seals.

The American Dental Association relief fund contributes half of the money which the needy dentist is granted under the rules for use of the fund. The constituent and component society of which the dentist is a member each contributes a fourth.

At the Boston meeting last August, the House of Delegates voted to receive a resolution that the Constitution and Bylaws be amended to provide that the present relief grant of the Association be doubled. In accordance with the Bylaws of the Association this proposed amendment will be voted on at the next regular meeting of the House.

MURRELL C. WELLMAN HEADS LIBRARY BUREAU OF ASSOCIATION

Murrell C. Wellman, assistant librarian of the Library Bureau for the past two years, has been appointed li-

Murrell C. Wellman, newly appointed librarian of the American Dental Association

brarian, effective October 1, 1947. Mr. Wellman succeeds Mrs. Josephine Hunt who has been with the Association for twenty years. Mrs. Hunt will continue to work with the bureau, occupying the post of associate librarian.

Mr. Wellman's educational background consists of a bachelor of arts degree from the Central Y.M.C.A. College in Chicago, 1941, and a bachelor in library science degree from the University of Chicago Graduate Library School, 1946. He also completed his junior year at the Chicago College of Dental Surgery, Loyola University.

A.D.A. STAFF MEMBER LECTURES TO FACULTY AT LOYOLA UNIVERSITY

Shailer Peterson, director of educational measurements of the Council on Dental Education of the American Dental Association, will present lectures at the Chicago College of Dental Surgery, Loyola University, on January 21, February 18, March 17 and April 21. Dr. Peterson, a qualified specialist in current teaching procedures, was invited to address the entire dental faculty on a series of six lectures during November to April.

R. W. McNulty, dean of the college, recently announced that Dr. Peterson's lectures will cover such subjects as examination construction, grading methods, curriculum development, course of study organization, effectiveness of laboratory and clinic teaching versus lecture demonstration, use of visual aids and other special methods, and methods of evaluating teaching technics. The lectures, which are scheduled for 7 p.m., are followed by open discussion and a question and answer period.

A.D.A. PUBLISHES ILLUSTRATED BOOK ON ORAL HEALTH

The second and revised edition of *Teeth, Health and Appearance,* prepared for use in waiting rooms of practicing dentists and of clinics, for teaching purposes in elementary schools, and in libraries, is now ready for distribution.

This attractive book is case bound in blue cloth and contains more than a hundred illustrations of which more than half are in color. The full page illustrations easily can be used as a visual aid when explaining the structure of the teeth and mouth.

Structure of the teeth, personal appearance, relations between the dentist and child patient, irregular teeth, diet and mouth health, the use of roentgenograms in dentistry, mouth hygiene and dentures are discussed and illustrated in this book.

Teeth, Health and Appearance may be ordered from the American Dental Association at $3.50 a copy.

DENTAL SOCIETIES

CHICAGO DENTAL SOCIETY TO FEATURE CLINICS AT MEETING

The 1948 midwinter meeting of the Chicago Dental Society is scheduled for February 9 to 12 at the Stevens Hotel. The limited attendance clinics of the 1947 meeting were so popular that the program for this year has been expanded to allow more dentists to attend the clinics of their choice.

Distinguished clinicians will present practical programs on Monday and Tuesday mornings, as well as on Monday, Tuesday and Wednesday afternoons of the meeting. Dentists should include alternate choices when ordering limited attendance clinic tickets. The price of attendance at each clinic is $2, which should be enclosed with each request.

Members of the American Dental Association may obtain a program of the meeting by writing to the Chicago Dental Society, 30 North Michigan Ave., Chicago 2.

Metropolitan District Dental Society Holds Annual Dinner

Speakers and guests of honor included, seated (left to right): John F. Conlin, Arthur P. Connelly, James H. Maycock, William D. Wellock and Joseph F. Volker, and standing (left to right): Edwin J. Morse, James M. Dunning, L. T. Maloney, Herbert I. Margolis and William M. Parks

DISTRICT SOCIETY HOLDS MEETING IN BOSTON

The Metropolitan District Dental Society of Boston held its annual meeting on October 22. The afternoon program was devoted to group discussions of specific problems in dentistry, and the evening program consisted of a business meeting followed by dinner.

Speakers at the dinner were John F. Conlin, director of medical information and education, Massachusetts Medical Society, and James H. Maycock, president, and L. T. Maloney, assistant to the president, both of the Massachusetts Dental Society.

Honored guests at the meeting were Dean Joseph F. Volker, Tufts College Dental School; Dean James M. Dunning, Harvard School of Dental Medicine, and William D. Wellock, director of the division of dental health, Massachusetts Dental Society.

In connection with the district meeting, there was a local broadcast on dental health with the following persons participating: Dr. Maycock, Arthur P. Connelly, chairman of the Metropolitan District Dental Society, and William M. Parks, chairman of the Dental Health Committee of the society.

OFFICERS AND CLINICIANS TOUR WASHINGTON DENTAL SOCIETIES

Officers of the Washington State Dental Association and clinicians recently toured several large districts of that state, meeting jointly with the Yakima Valley and the North Central district societies, September 15 to 18, with the Lower Columbia, Lewis, Clark and Grays Harbor district societies, October 1, with the Tacoma and Thurston-Mason district societies, October 28, and with the Mount Baker District Dental Society, November 3. On November 19, the Grays Harbor District Dental Society served as host in a combined meeting with the district dental societies of Lewis County and Thurston-Mason Counties to end thus far the survey which will have included the entire state by February.

The meetings are based on the threefold idea of demonstrating technics by means of table clinics, of informing the

membership generally concerning state association business by means of a business session and of receiving an expression of views from the members.

William P. McGovern, Tacoma, president, and other state officers planned the programs with the hope of stimulating interest in the work of the state dental association as well as of providing a means of bringing to the individual dentist some of the latest developments in dental procedure.

Speakers at the table clinics are Dr. McGovern; O. T. Olsen, Seattle; Frank E. Wood, Seattle; Cecil F. Lindley, Seattle; J. Glen Murray, Jr., Tacoma; Howard I. Gilbert, Seattle; Noyce Russell, Seattle; Ernest M. Jones, Seattle; Gordon G. Ross, Tacoma; H. L. Monzingo, Tacoma; Lyle Kelly, Tacoma, and M. W. Abernethy, Tacoma.

Thomas A. Swayze, Seattle, is executive secretary and F. J. Dingler, Seattle, is secretary-treasurer of the state association.

SOUTH DAKOTA DENTAL SOCIETY HAS DENTAL HEALTH MEETING

The South Dakota State Dental Society conducted a dental health conference in Huron, December 7, 8 and 9, for the purpose of examining the state's dental health problems and determining methods for the development of preventive, educational and treatment services, in an attempt to control dental diseases in children.

The conference followed the same pattern employed by other state dental societies that recently have attempted to survey dental health problems. Participating in the conference were H. C. Whitney, president of the South Dakota Dental Society; M. J. May, member of the Committee on Dental Health Education; A. L. Russell, director, Division of Dental Health, South Dakota State Board of Health; F. L. Weller, head of the Department of Sociology, University of South Dakota; E. W. Elmen, secretary, South Dakota Dental Society; T. E. Burrington, former secretary, State Board of Dental Examiners, and Allen O. Gruebbel, executive secretary, Council on Dental Health, American Dental Association.

DENTAL HEALTH CONFERENCE HELD IN SPRINGFIELD, ILLINOIS

Sponsored by the Council on Dental Health of the Illinois State Dental Society and the Division of Public Health Dentistry of the Illinois Department of Public Health, the first Illinois dental health conference was held in Springfield on November 7, 8 and 9. The conference was attended by approximately 60 dentists, each a representative of his district dental society.

The presentation of papers, covering such phases of dental health as preventive procedures, dental programs in Illinois, dental needs and dental man power in Illinois and payment for dental care, and group discussions on dental health projects were features of the program during the first two days of the meeting. Reports of each discussion group were presented on the last day of the conference, at which time they were discussed and approved, or modified for approval, by the body as a whole.

Some of the more important recommendations that came out of the three day conference follow: The number of dentists in Illinois should be increased, with a desirable ratio of 1 dentist to 1,100 population as the immediate goal. Efforts should be made to secure a more even distribution of dentists throughout the state. Periodic registration of Illinois dentists should be established. The number of dental hygienists should be increased as rapidly as possible; the employment of dental assistants should be encouraged, and study should be given to the training of dental nurses with the view of determining whether

they would be an asset as auxiliary aids.

The dental health program of Illinois should be extended to reach more people; the dental health educational program for dentists should be improved; dental care should be provided for indigents, particularly the children of indigents, at community expense. Indigency, in this case, is to be determined by an agency in the community that has the approval of the local council on dental health. Services for the indigent may be rendered in private dental offices or clinics as determined by the local council on dental health.

A program of dental health education for the community should be provided by district societies, and a study should be made to determine the best means of conducting such programs in the community.

Topical application of sodium fluoride for the prevention of caries was approved. The use of bone meal as a preventive measure was disapproved. Until present experiments have produced beneficial results, no new programs of fluorination of community drinking water should be undertaken.

Lon W. Morrey, editor of THE JOURNAL, and Allen O. Gruebbel, executive secretary of the Council on Dental Health of the Association, addressed the conference.

KANSAS CHILDREN TO RECEIVE BETTER DENTAL CARE

In a form letter directed to all members, the Kansas State Dental Association recently urged that serious thought be given to the implementing of the state program outlining more and better dental education and care for Kansas children.

Confident that dentistry can solve this problem without government intervention but fully cognizant of the fact that cooperation of every dentist is necessary, the Kansas State Dental Association emphasized each dentist's responsibility in guiding and aiding the dental phases of the community's health needs.

As originally outlined by the American Dental Association through the Council on Dental Health, the program is divided into research, education and dental care phases, with the idea of each state council doing its share to stimulate interest throughout the profession on the community or local level.

In Kansas, the following recommendations were approved at the annual meeting of the association in 1947: research—supplying of solutions of sodium fluoride for topical application on children's teeth, free on request, and instituting of a research project in the fluorination of the communal water supply of the city of Ottawa; education—establishing and maintaining of community school dental health programs, preparing the manual, *Dental Health Program for Elementary and Secondary Schools,* supplying of dental forms authorizing dental examinations in keeping with Kansas statutes permitting the local financing of such a program, and utilizing dental films and other visual aids for the promotion of dental care, control and prevention; dental care—arranging for complete dental care, through the county welfare department, for children on assistance rolls.

The afore-mentioned manual, forms, films and visual aids, distributed by the Kansas State Board of Health, are free, on request, to dentists practicing in that state and to the proper local agencies.

THREE DENTISTS HONORED FOR LONG SERVICE IN PENNSYLVANIA

At a testimonial dinner on November 12, the Easton Dental Society, Easton, Pa., paid tribute to three local dentists who have been practicing their profession for fifty years or more. The dentists are: William C. Middaugh, Easton; Wilkie Whitelaw, Easton, and Harry W.

Souders, Sr., Phillipsburg, who have practiced dentistry for fifty-five, fifty-one and fifty years, respectively.

William H. Schuler, president of the LeHigh Valley Dental Society, paid tribute to the three men in behalf of that society, and John C. Buchanan, president of the Easton society, presented scrolls and life memberships in the society to each of the guests of honor.

An interesting point brought out by R. E. V. Miller, a member of the State Board of Dental Examiners and Dental Council, is that two of the three dentists at first practiced dentistry without a state license. The first dental licenses were issued in Pennsylvania in 1897.

HAWAII DENTAL SOCIETY ELECTS OFFICERS AT ANNUAL MEETING

At the forty-fifth annual meeting of the Hawaii Territorial Dental Society, held October 30 and 31 and November 1 in Honolulu, T. H., the following officers were elected for the year 1947-1948: president, Sau Yee Chang, Lihue, Kauai; president-elect, H. I. Kurisaki; treasurer, F. S. Kagihara, and secretary, John H. Dawe, all of Honolulu.

CINCINNATI DENTAL SOCIETY PLANS STUDENT EDUCATIONAL LOAN FUND

The Cincinnati Dental Society recently elected a five man committee to work out the details of a loan fund plan to provide monetary assistance to worthy dental students in acquiring their professional education.

Among the rules for eligibility for aid through the loan fund that were submitted by the committee were the following: that the student shall have completed his predental education and already shall be enrolled in a dental college; that he be a resident within the jurisdiction of the Cincinnati Dental Society; that he promise to practice dentistry in accord with the code of ethics of the Cincinnati Dental Society and the American Dental Association, and that he promise to repay, without interest, to the loan fund committee, the amount of the loan, within five years after graduation.

The members of the committee, which is to be known as the Cincinnati Dental Society Educational Loan Fund Committee, are F. E. Lytle, chairman, S. A. Schmid, J. P. Becker, R. C. Harkrader and F. W. Black.

LOUISIANA DENTISTS SERVE ON FARM BUREAU HEALTH COUNCIL

The betterment of hospital and other facilities for the improvement of the health of rural people, with dentists participating actively with the health agencies and allied groups, is the aim of the Louisiana Farm Bureau Health Council of the Louisiana Farm Bureau Federation, Inc. In connection with this program, the council on dental health of the Louisiana State Dental Society recently anounced the appointment of J. Melville Smith as counselor to the health council and of Colin A. McHardy to the executive committee.

Meetings of the health council are scheduled for twice a year at which times programs will be formulated and executed with the idea of improving the general health of the people of the state.

EMOTIONAL BACKGROUND MAY CAUSE DENTAL OR FACIAL PAIN

According to Edward Weiss, professor of clinical medicine at Temple University, Philadelphia, dental trouble or facial pains frequently can be traced to emotional origins, and a study of the emotional background rather than a search for foci of infection may be the proper approach to diagnosis in many cases.

Speaking before a meeting of the First District Dental Society last November,

Dr. Weiss emphasized the importance of studying the patient's emotional troubles before advising the extraction of teeth or the removal of tonsils. Dr. Weiss expressed the belief that many teeth have been extracted and many sinuses have been operated on in cases in which a more careful analysis might have shown that the painful condition actually was not caused by a focal infection.

DENTISTS AND PHYSICIANS HEAR TALK ON MEDICAL PROBLEMS

Cmdr. Walter W. Dalitsch, reserve liaison officer at the Ninth Naval District Headquarters, addressed a combined meeting of the Lincoln District Dental Society and the Lancaster Medical Society on November 3 in Lincoln, Neb. His subject was "Medical Problems in Dentistry." A similar program was given at Omaha, Neb., on November 4.

ANNOUNCE FUTURE MEETINGS OF STATE DENTAL SOCIETIES

Minnesota.—February 23, 24 and 25 are the dates scheduled for the 1948 annual meeting of the Minnesota State Dental Association in St. Paul.

Oregon.—The Oregon State Dental Association will hold its annual meeting on February 5, 6 and 7 in Portland.

Rhode Island.—The annual meeting of the Rhode Island State Dental Society is scheduled to be held January 19, 20 and 21 in Providence.

INTERNATIONAL

THIRTY-NINE NATIONS ACT TO PROMOTE CANCER RESEARCH

To promote international cooperation in cancer research, representatives of thirty-nine nations attending the Fourth International Cancer Research Congress at St. Louis last September established the International Cancer Research Commission. The commission will meet annually. Although this new organization will have autonomy, it will not replace the much larger International Cancer Research Congress, which will continue to meet at three year intervals.

The number of member nations is expected to increase as the International Cancer Research Commission begins to function. Each nation will have one representative on the commission, and all representative nations, regardless of size, will have equal voting power.

SOUTH AFRICAN DENTAL SCHOOL ENROLLING RECORD NUMBERS

According to an item in the *South African Dental Journal,* dentistry is becoming one of the most popular professions in the Union of South Africa. An enrollment of more than 300 students is straining the resources of the Union's only school of dentistry in Johannesburg. Such a rapid increase in the demands on the facilities of the school was not considered likely when the university opened its new dental hospital and school five years ago. However, as a result of wartime changes many more people now can afford dental treatment, and social services are bringing dentistry within the reach of still greater numbers.

CAPE TOWN TO OPEN MUNICIPAL DENTAL CLINIC SOON

The first municipal dental clinic in South Africa, at which those unable to afford the usual fees will be given full treatment, will be opened in Cape Town in the near future. The new clinic will administer all forms of dental treatment, and it is understood that patients will be asked to make some small contribution, according to their means, for the treatment they receive.

Prior to this time the clinics have

been able to provide dental care only in the most urgent cases. The new clinic will facilitate more complete service, especially in the field of prevention.

JOURNALS FROM GERMANY AND ARGENTINE ARRIVE AT LIBRARY

For the first time since World War II, the library of the American Dental Association has received a copy of the German dental journal, *Deutsche Zahnärztliche Zeitschrift.*

A copy of *Revista del Circulo Odontologico de Rosario,* which is the first issue of this Argentine dental journal since 1940, also was received by the library.

DENTAL EDUCATION

ILLINOIS UNIVERSITY OFFERS SEVERAL POSTGRADUATE COURSES

A postgraduate course of evening lectures designed to give the dentist an appreciation of and background in oral surgery will be offered by the College of Dentistry, University of Illinois, beginning January 5. The course, called "Oral Surgery I—Fundamentals of Oral Surgery," will be held from 7:30 to 9:30 p.m. on six consecutive Mondays.

The subject matter will include the growth and development of the face and jaws, surgical anatomy of the head and neck, etiology and treatment of hemorrhage, chemotherapy and antibiotics, asepsis in oral surgery and the value of roentgenograms in oral surgery.

Bernard G. Sarnat, acting head of the department of oral and maxillofacial surgery, will be in charge of the course. The lectures will be given by Allan G. Brodie and H. P. Jenkins of the University of Illinois, Harry Sicher and Gustav W. Rapp of Loyola University, L. R. Main of St. Louis University and Clayton Loosli of the University of Chicago.

The course is a prerequisite to two evening courses dealing with the clinical aspects of oral surgery, the dates of which will be announced later.

Another postgraduate course, "Periodontia I," will be offered by the university, beginning January 7. This course, dealing with the physiology and pathology of periodontal structures, will be given by Balint Orban and associates.

Further information on all these courses may be secured from Isaac Schour, Associate Dean, College of Dentistry, University of Illinois, 1853 West Polk St., Chicago 12.

The College of Dentistry will offer a four week, full time postgraduate refresher course in oral and maxillofacial surgery, starting February 16.

This course, designed primarily for the general practitioner, will consist of didactic and clinical instruction. Each student will actively participate in the minor oral surgery clinic. The more difficult operations will be demonstrated by the faculty.

Dr. Sarnat will head the faculty for the course. Eli Olech, Henry J. Droba and E. Lloyd DuBrul also will instruct the classes.

Registration will be limited to four students in each class. Succeeding courses on the same subject will be offered on May 3 and July 6.

Further information on this course may be secured from Dr. Sarnat, College of Dentistry, University of Illinois, 1853 West Polk St., Chicago 12.

JUNIOR A.D.A. SPONSORS LECTURES ON DENTAL PRACTICE

Three of a series of six lectures on "The Practice of Dentistry" have been presented by Ernest R. Granger of Mt. Vernon, N. Y., at the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, under the auspices of the Junior American Dental Association. Dr. Granger will continue to present his philosophy

of dentistry in lectures on February 18, when he will discuss mucostatics; on March 17, when his subject will be biomechanical partial dentures, and on April 21, when he will lecture on impressions and bites.

Practicing dentists, as well as undergraduates, are urged to attend these last three lectures by Dr. Granger, who is recognized as one of the country's outstanding dentists.

BUHLER SUCCEEDS BYRNES AS DEAN AT EMORY UNIVERSITY

John E. Buhler, associate professor of oral surgery and secretary of the faculty of the School of Dentistry, Temple University, Philadelphia, has been appointed dean of the School of Dentistry, Atlanta-Southern Dental College, Emory University, Atlanta, Ga., by President Goodrich C. White. Dr. Buhler succeeds Ralph R. Byrnes, who retires at the end of the current academic year.

John E. Buhler, Philadelphia, whose appointment as dean of the School of Dentistry, Atlanta-Southern Dental College, Emory University, was announced recently

Dr. Buhler, a native of Indiana, who is 39 years of age, prepared for dental study in the College of Liberal Arts of Indiana University and was graduated in 1935 from the School of Dentistry, University of Indiana, where he later became a full time teacher in materia medica and therapeutics, dental histology, oral histopathology and clinical oral surgery. He assumed his present position at Temple University in 1942.

CONGRESS ON DENTAL EDUCATION TO BE HELD IN FEBRUARY

The Council on Dental Education has announced that the Fourth Congress on Dental Education and Licensure will be held in connection with the midwinter meeting of the Chicago Dental Society at the Stevens Hotel in Chicago on Saturday, February 7.

Wilbert Jackson of Clinton, N. C., chairman of the council, will preside at the morning session, at which the general topics for consideration will be teaching and examining. Walter H. Wright, dean of the College of Dentistry of New York University, will present a paper on the examining processes of state boards of dental examiners from the standpoint of the dental school teacher and administrator. W. A. Wilson, secretary of the State Board of Registration and Examination in Dentistry of the State of New Jersey, will present a paper on the curriculum and teaching in dental schools from the standpoint of the state dental examining boards. A number of deans, teachers and examiners will be invited to lead the discussion of these two papers.

The afternoon session, which will be conducted by the Advisory Board for Dental Specialties, will be devoted to a

round table discussion of specialties in dentistry. John C. Brauer, professor of pedodontics and director of postgraduate studies in the School of Dentistry of the University of Washington, is president of the board, and Harold J. Leonard is secretary. Representatives of the specialty boards in oral surgery, orthodontics, pedodontics, periodontology and prosthodontia will participate, after which discussion will be invited from the floor. Dental school teachers and administrators and members of state and national examining boards are especially invited, and all visitors to the midwinter meeting of the Chicago Dental Society will be welcomed.

FEDERAL AGENCIES

FARM FAMILIES INCREASE MEDICAL EXPENDITURES

A preliminary release on a survey of farm family living expenses in twenty-five states, made by the U. S. Department of Agriculture, indicates that there is an increase in dollars spent for medical care, considerably outstripping price rises.

Farm operator families in the north central and southern states spent an average of $82 a family for medical care in 1945. In 1941 the average expenditure in those states was $51. This increase was roughly four times the price rise of 13.7 per cent as measured by the Consumer's Price Index of the Bureau of Labor Statistics. This index, compiled to measure price changes in large cities, was used because it is the only price index available for medical care.

In both 1941 and 1945 the leading item of expenditure for medical care was physicians' services. In 1945, physicians' services took an even larger part of the medical care dollar than in 1941, 44 per cent in 1945 in contrast to 37 per cent in 1941.

Expenditures for hospital care also increased relatively more than total expenditures for medical care. In contrast, expenditures for eye tests and glasses, for dental care and for drugs and medical supplies were less important in the total in 1945 than in 1941, although there was no decrease in the dollar expenditure for these.

In 1945 southern families were spending only 70 per cent as much as northern families for medical care. Southern families spent a little more than half as much as northern families for hospital care and dental care. Between 1941 and 1945, however, the South increased its expenditures proportionally more than did the North. In 1945 southern families were spending 71 per cent more than in 1941, while northern families spent 58 per cent more. In the South, expenditures for physicians' services and hospital care increased 114 and 100 per cent, respectively. In the North, expenditures for these items increased 84 and 89 per cent, respectively.

PATENTS ISSUED IN OCTOBER OF INTEREST TO DENTISTS

2,428,425 Israel M. Levitt
Self-Contained Emergency Oxygen Breather

2,428,518 Samuel James Everett
Hypodermic Tubing, Dental Broaches, and the like

2,428,689 Albert E. Sykes
Dental Instrument

2,428,773 Morris Beresin and Victor E. Beresin
Art of Dentistry

2,428,808 James S. Miller
Articulator With an Operating Handle for Grinding and an Adjustable Incisive Guide With Arcuate Movement

2,428,975 Anthony H. Lamb
Illuminated Mirror

2,429,183 Samuel D. Goldberg
Medicament Cartridge or Vial

2,429,238 Joseph S. Restarski and

Arthur P. Black
Refrigeration Apparatus for Inducing Local Anesthesia

2,429,356 Richard J. Hicks
Surgical Cutter Guard

2,429,437 Maurice J. Walker
Toothbrush

2,429,472 Clarence G. Maxson
Headrest

2,429,473 Adam J. May and Clarence G. Maxson
Headrest Means

2,429,740 Gates B. Aufsesser
Toothbrush

2,429,931 Luther W. Fromm
Pontic Tooth

ARMY AND NAVY

LOWER DENTAL STANDARDS FOR NAVY ENLISTED MEN

Because recruitment for the Navy has been below the quotas, with half of the enlistments expiring between November 1947 and June 1948, physical standards for enlistment were lowered last November.

Before this action was taken, a prospective sailor was required to have eighteen natural teeth. Now he may be edentulous, provided he has or is able to wear satisfactory full dentures.

Requirements for vision were lowered from 6/20 to 2/20 in each eye, provided active or progressive organic disease is not present and vision can be corrected to 20/20. The upper height limit was raised from 6 feet 4 inches to 6 feet 6 inches, but the lower limit remains at 5 feet.

NAVAL DENTAL CORPS ANNOUNCES APPOINTMENTS

Cmdr. Neil Joseph Overton and Lt. Cmdr. Eugene Arthur Walsh have received appointments in the Dental Corps of the regular Navy under the transfer program. Cmdr. Overton has been assigned to active duty at the Naval Training Center, San Diego, Calif., and Lt. Cmdr. Walsh goes on active duty at the Receiving Station, Naval Station, Terminal Island, Calif.

Earlier in November 1947, the following transferees received appointments in the Dental Corps of the regular Navy: Lieut. (jg) Robert S. Neskow, to the U. S. Naval Air Station, Norfolk, Va., and Lieut. (jg) Roy C. Rumming, to the U. S. Marine Corps Base, San Diego, Calif.

Two reserve dental officers have been ordered to active duty at the 1st and 7th Naval District Headquarters to assist in carrying out the program for members of the Naval Reserve Dental Corps on inactive duty. They are: Cmdr. R. H. Bethel, Manchester, N. H., naval reserve representative for the 1st Naval District, and Lt. Cmdr. S. F. Leichter, Orange, N. J., naval reserve representative for the 7th Naval District.

REAR ADMIRAL CHANDLER ADDRESSES MILITARY SURGEONS

Rear Admiral A. W. Chandler, assistant chief of the bureau for dentistry and chief of the dental division, represented the Navy Dental Corps at the meeting of the Association of Military Surgeons held in Boston on November 13. He delivered an address on "Dental Education and Research in the Navy."

NAVY RESERVE OFFICERS ASKED TO SUBMIT CORRECT ADDRESSES

Reserve officers of the U. S. Navy Medical Corps who are on inactive duty are asked to furnish a record of the address to which they wish material sent.

BuMed, the official newsletter of the medical bureau of the Navy, suggests that any officer who fails to receive his mail from BuMed or receives it irregularly or through forwarding should send

his present address to the Publications Distribution Office, Bureau of Medicine and Surgery, Potomac Annex, Navy Department, Washington 25, D. C.

GENERAL SMITH INSPECTS THIRD ARMY AREA DENTAL SERVICE

Brig. Gen. Thomas L. Smith, chief of the dental division, Office of the Surgeon General of the Army, inspected Army dental facilities in the Third Army Area during the week of September 21-27. His inspection itinerary included visits to Oliver General Hospital, Augusta, Ga.; Fort McPherson, Ga.; Fort Benning, Ga.; Fort Jackson, S. C., and Fort Bragg, N. C. General Smith was accompanied on his inspection tour by Col. Beverley M. Epes, Third Army dental surgeon.

VETERANS

VA DISPLAYS ACTIVE INTEREST IN PROSTHETIC DEVICES

The first class for prosthetic device representatives of the Veterans Administration was held in October in Washington, D. C. During the seventeen day course the students were given instruction concerning the latest developments and improvements in the prosthetic field. These employees, all amputees themselves, aid disabled veterans in selecting and fitting artificial limbs, plastic eyes and other devices. Two other classes will be held, the next being scheduled tentatively for the middle of January.

The Veterans Administration reference exhibit of prosthetic devices, the only one of its kind in the world, was opened to the public on July 16. The permanent exhibit may be seen in Room 890, Veterans Administration Bldg., Vermont and H Sts., N. W., Washington, D. C.

This exhibit is open from 10 a.m. to 4 p.m., Mondays through Fridays, to doctors, manufacturers, research authorities, disabled veterans and others interested in prosthetic devices. On display are almost 1,000 items including artificial limbs, hearing aids, aids for the blind, plastic eyes, wigs, cosmetic hands, facial devices, wheel chairs, crutches and canes.

In addition to being of use to VA prosthetic specialists, the exhibit is expected to help in eliminating duplication of effort in research work.

GEN. HAWLEY RESIGNS AS MEDICAL CHIEF OF VA

The resignation of Maj. Gen. Paul R. Hawley as chief medical director of the Veterans Administration was announced on November 24 by Gen. Omar N. Bradley, who at the time was the administrator.

Maj. Gen. Hawley had held the position of chief medical director of the Veterans Administration since August 1945. His resignation took effect on December 31.

Carl R. Gray, Jr., vice president of the Chicago and North Western Railway, will succeed Gen. Bradley as head of the Veterans Administration.

GENERAL NEWS

PREDENTAL SOCIETY ORGANIZED AT NORTH CAROLINA UNIVERSITY

During the past summer a group of seven predental students of the University of North Carolina formed an honorary organization believed to be the first in the nation for this class of students. Though it has existed only a short time, the Pi Delta Alpha Pre-Dental Society is rapidly becoming established at the university, and according to the reports of some of the members of the chapter, its establishment has been applauded and

encouraged by many leaders in the field of dental education.

Pi Delta Alpha maintains two major objectives. The society attempts to stimulate excellence and achievement in the student's predental education by furnishing a goal toward which he or she may strive while attending undergraduate college. It also endeavors to interest and recruit for the dental profession students who are outstanding in the field of science. A program of lectures, to be delivered by distinguished dentists and educators, now is being formulated. It is hoped that these talks will acquaint the predental student more closely with his chosen profession.

Pi Delta Alpha has established several minimum requirements for election to the society. The student must be engaged in courses leading to the study of dentistry and must have completed at least half of the minimum requirements for entrance into dental school. He is required also to maintain for one year an average of at least B in his predental science courses as well as in his academic work.

Plans are being considered to establish chapters at other university campuses, if the need and desirability of such expansion are felt, but such expansion will not be undertaken until the first chapter has been in operation for at least a year and has become well established.

BAUER RECEIVES NATIONAL AWARD FOR WORK IN HEALTH EDUCATION

The 1947 Prentiss Award of the Cleveland Health Museum for distinguished work in the promotion of health education in the United States was presented to W. W. Bauer, director of the Bureau of Health Education of the American Medical Association, in tribute to his outstanding contribution to health education during the past year.

Dr. Bauer is also associate editor of *Hygeia,* the health magazine of the American Medical Association.

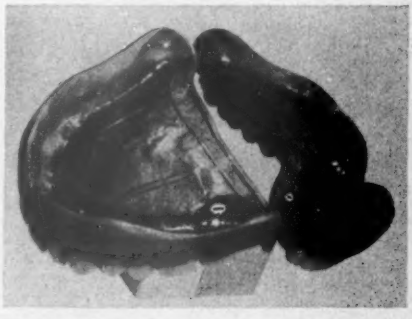
WASHINGTON UNIVERSITY DENTAL ALUMNI TO MEET

Washington University Dental Alumni will celebrate their eighty-second annual meeting March 5 and 6 at the School of Dentistry, Washington University, St. Louis, according to an announcement by V. P. Thompson, Webster Groves, Mo., secretary-treasurer of the association.

SEEK IDENTIFICATION OF MURDERED WOMAN IN WISCONSIN

The Oneida County sheriff's office, Rhinelander, Wis., would appreciate any information leading to the identity of a murdered woman, found buried in Oneida County last September, sixteen miles west of Rhinelander.

Following is a description of the body: stocky build; height, 5 ft. 2 in.; weight, 170 pounds; age, between 50 and 60; hair, brownish-gray, and teeth, upper denture in mouth, lower missing. Any dentist who may recognize this woman by the description or the picture of the upper denture should contact Albert Onson, Rhinelander, Wis.



Photograph of the upper denture of an unidentified murdered woman found in Oneida County, sixteen miles west of Rhinelander, Wis., last September

ILLINOIS UNIVERSITY AWARDS RESEARCH FELLOWSHIPS

On January 1 or shortly thereafter, the University of Illinois graduate school will announce the names of the four candidates awarded research fellowships for one year each in the fields of medicine, dentistry and pharmacy. The fellowship year will begin on either July 1 or September 1 of this year. The appointments cover one calendar year with a one month vacation.

Fellows are eligible for reappointment after one year, in competition with new candidates. Candidates for future fellowships in these fields of research must have completed not less than eight years of formal training beyond high school in work leading to various combinations of the B.S., B.A., M.S., D.D.S. and M.D. degrees.

To secure formal applications, those eligible for the fellowships should write to the Secretary of the Committee on Graduate Work in Medicine, Dentistry and Pharmacy, 1853 West Polk St., Chicago 12.

THREE DENTAL FRATERNITIES ANNOUNCE FEBRUARY AFFAIRS

The Illinois Alumni Club of Alpha Omega will hold its annual dinner-dance on Sunday, February 8, in the Boulevard Room of the Sheraton Hotel, Chicago. The chairman is Jules Hazelkorn, 2345 W. Devon Ave., Chicago.

The National Conclave of Delta Sigma Delta will be held February 7 and 8, at the Sheraton Hotel, Chicago. The conclave will precede the meeting of the Chicago Dental Society.

The Hotel Pennsylvania will be the scene of the annual convention of the Sigma Epsilon Delta Fraternity, February 21 and 22, in New York. For information and reservations write to Alexander L. Ungar, 211 Central Park West, New York 24.

BRITISH FILM AVAILABLE FOR GENERAL DISTRIBUTION IN U.S.

British Information Services announces that the film, "Your Children's Teeth," is available for loan. The film explains the structure of deciduous and permanent teeth and illustrates the advantages of good diet, cleanliness and early attention to decay.

For information on the distribution of this film, which is in two reels and has a running time of fourteen minutes, write to British Information Services, 30 Rockefeller Plaza, New York 20, for the location of the office nearest your city.

TWO STATE BOARDS ANNOUNCE DATES FOR EXAMINATIONS

The South Dakota State Board of Dental Examiners will hold its next examination January 11 through 15. Applicants should write to R. W. Ellis, secretary, Salem, S. D., for information.

On February 3, 4 and 5, the Massachusetts Board of Dental Examiners will hold its next examination. Application and other data should be filed with the secretary of the board, John C. Wilson, 413 N. State House, Boston, at least two weeks before the dates set for the examination.

MINNESOTA REPORTS ON SCHOOL DENTAL RECORDS

The annual report recently issued by the division of dental health, Minnesota Department of Health, indicates that the schools of the state exceeded nearly all previous records during the school year 1946-1947.

Five thousand more pupils were included in the dental health program in 1946-1947 than during the previous year. In 400 school rooms, compared with 312 during the previous year, every pupil brought to the teacher a certificate from a dentist indicating that during the year

all necessary dental work had been done. Percentages of pupils having all necessary dental work completed during the school year 1946-1947, plus the summer vacation of 1946, increased slightly in all types of schools.

Rural schools in the three counties which have the full time services of a dental health adviser achieved an average rating of more than 70 per cent on completed dental work. Nine schools in Minnesota had ratings of from 95 to 100 per cent.

PENN DENTAL JOURNAL COMPLETES FIFTIETH YEAR

The *Penn Dental Journal,* founded in 1897 by Edward C. Kirk, has completed its fiftieth year of publication. The journal is the undergraduate publication of the Thomas W. Evans Museum and Dental Institute School of Dentistry, and has been active in presenting papers written by students of the school. The oldest publication of its kind in America, it boasts an unbroken continuity except for one year during the World War I.

Features of the *Penn Dental Journal* are original articles by students on all phases of dentistry, faculty biographies, news of alumni, faculty and societies, and abstracts and book reviews.

THREE SCIENTISTS SHARE 1947 NOBEL PRIZE FOR MEDICINE

Bernardo A. Houssay of Buenos Aires and Carl F. Cori and his wife, Gerty Cori, both of St. Louis, share the Nobel Prize in medicine for 1947. Dr. Houssay was honored for his work on the pituitary hormones, which, he discovered, control the activity of all other ductless glands in the body. These secretions play a part in diabetes.

The Coris discovered and synthesized a complicated enzyme that begins the process of converting glycogen into sugar in the body.

A.A.A.S. PLANS CENTENNIAL MEETING FOR SEPTEMBER 1948

The Centennial Policy Committee of the American Association for the Advancement of Science has voted to hold the meeting celebrating the hundredth anniversary of the association in Washington, D. C., on September 13-17, 1948. On instructions of the executive committee of the association, the annual meeting tentatively planned for the Christmas week of 1948 in New York has been canceled. The 1949 annual meeting will be held in New York, December 26-31.

The general theme of the centennial meeting will be that science is independent of national boundaries and that the best hope of realization of one world in objectives is by means of the unifying influence of science. Besides sessions devoted to this theme, there will be meetings at which authorities in the various sciences will present surveys of problems in their fields of specialization.

Afternoons will be free of formal sessions to permit members to participate in the numerous open house invitations extended to visitors by the research institutions of the Capitol area.

SAN FRANCISCO DENTIST PRESENTS CLINICS IN ENGLAND

E. Frank Inskipp of the staff of the School of Dentistry, College of Physicians and Surgeons, returned in September from a three month vacation in England, his native homeland.

During his stay Dr. Inskipp spent much time visiting the colleges of Cambridge and presented clinics on the inconspicuous Class III gold foil technic and the impression technic with hydrocolloid for inlays at Guys Hospital Dental School and the University College Hospital Dental School. He also gave clinical demonstrations on the hydrocolloid technic for inlays to a group of London dentists.

JUDICIAL COUNCIL

A PRIVATE DENTAL OFFICE SHOULD NOT BE TERMED A CLINIC

THE Judicial Council of the American Dental Association is required to render many opinions and decisions each year. Some of these opinions afford interesting reading as well as guides to reasonable conduct. In publishing them, all parts are deleted that would identify the inquirers or those whose names may be associated with the controversy. The questions raised in the following inquiry are covered by the Code of Ethics of the American Dental Association, copies of which may be secured by writing to the central office of the Association.

The . . . District Dental Society
October 6, 1947

Dr. Harold Hillenbrand, Secretary
American Dental Association
222 East Superior Street
Chicago 11, Illinois

Dear Dr. Hillenbrand:

Would it be possible for the American Dental Association to clarify its Code of Ethics or interpret it in regard to clinic practice for our guidance?

It seems that the younger dentists are locating in residential districts and, in some instances, may put up a small sign in the following manner:

Queen Anne Dental Clinic
John Doe, D.D.S.

Would you consider this ethical?

Or a man may associate with a physician and establish an office as follows:

East Madison Medical & Dental Clinic
John Doe, M.D.
J. L. Roe, D.D.S.

What should be our attitude on the foregoing problems, and how would you advise us to handle them?

Sincerely yours,
. . . District Dental Society
(signed), Secretary

344 Fourteenth Street
San Francisco 3, Calif.
October 21, 1947

Dr. . . ., Secretary
. . . District Dental Society
. . .

Dear Doctor . . .:

Your letter of October 6, 1947, addressed to Dr. Harold Hillenbrand, secretary of the American Dental Association, was forwarded to the undersigned for reply.

Your letter is assumed to be an inquiry as to whether or not it is unethical for a member of the American Dental Association to designate his office as a named (not his name) dental "clinic." In addition, you put the same question for an instance in which a dentist in association with a physician designates his office as a named (not the physician's nor the dentist's name) medical and dental "clinic."

It is fundamental that that which is unlawful is unethical.

A portion of the "Law Defining and Regulating the Practice of Dentistry and Dental Hygiene" in your state (issued by the Department of Licenses in 1941 and re-dated November 1944) is quoted below:

Sec. 18. It shall be unlawful for any person or persons to practice dentistry under any name, except his or her own proper name, which shall be the name used in his or her license as issued by the director: provided, however, this shall not apply to any person now practicing dentistry in this state under the name of an association or trade name.

From this it is clear that it is unlawful for a dentist practicing in your state to re-designate his office as a "clinic." It is not unlawful, however, for a dentist (or a group of dentists) who was practicing under a corporation or trade name at the time the law was adopted to so continue.

For the strictly ethical considerations relating to the Code of Ethics of the American Dental Association only, we quote below from Section 10 of the Code of Ethics of our Association.

The use of the name "clinic" or "institute" or any other similar title that may suggest a public or semipublic activity to designate what is in fact an individual or a group private practice is misleading, and therefore unethical.

If the facts are substantially as implied in your letter to us, referred to above, there can be little doubt but that the practice or practices in question do not meet the requirements of the Code of Ethics of our American Dental Association.

In your letter you ask, "What should be our attitude on the foregoing problems, and how would you advise us to handle them?"

We do not have a copy of the Constitution and Bylaws of your District Dental Society or your State Dental Association but have no reason to presume other than that these contain ample provisions with which to deal with the violations described.

It is our idea that the offending member, or members, should have their attention called to their obvious obligations to your District Dental Society's Code of Ethics, to your State Association's Code of Ethics, to the Code of Ethics of the American Dental Association, and to Section 18 of your Dental Practice Act, and that if satisfactory arrangements are not made to abandon such practices you should proceed forthwith as is presumably provided in your District Dental Society's Constitution and Bylaws.

Very sincerely yours,
Ernest G. Sloman, Chairman
Judicial Council
American Dental Association

COUNCIL ON DENTAL EDUCATION

DATA ON THE TRAINING OF DENTAL LABORATORY TECHNICIANS

THE accompanying table presents some revisions and amplifications of the data concerning trainees in mechanical dentistry, previously published in THE JOURNAL.[1] The table is based on information furnished by the Veterans Adminis-

1. Trainees in Mechanical Dentistry. *J.A.D.A.* 35:291 (August 15) 1947.

tration and the Dental Laboratories Institute of America and on records compiled in the office of the Council on Dental Education.

As of July 10, 1947, thirty schools and 2,178 laboratories and dental offices have been approved under Public Law 346 or have contracts or agreements with the Veterans Administration to offer training for dental technicians. The thirty schools in twenty-four commercial and six nonprofit institutions enroll 2,898 students, and the 2,178 laboratories and dental offices offer training to 5,360 students, a total in training of 8,258. The table shows by states the number and enrollment in the schools, the number of approved laboratory and dental offices and the number of students being instructed in them, the number of dentists in each state and the ratio of students in training in mechanical dentistry to dentists.

It will be observed that the ratio of students to dentists for the country as a whole is 1 to 9.2; for the four states of Massachusetts, New Jersey, New York and Pennsylvania, 1 to 4, and for all other states, 1 to 20.5. Thus, four states with 24 per cent of the population of the nation and 31 per cent of the dentists enroll 69 per cent of all the students in training in mechanical dentistry.

Dental laboratory technicians in training, July 10, 1947

State	Schools		Laboratories			Dental offices, number approved*	Total in training	Total dentists, 1941	Ratio of students to dentists
	Number approved	Enrollment	Number approved	Enrollment	Total number of laboratories				
Ala.	—	—	8	9	50	—	9	596	1: 66
Ariz.	—	—	4	6	17	5	11	147	1: 13
Ark.	—	—	16	17	22	—	17	388	1: 23
Calif.	2	120	108	151	696	77	348	6,011	1: 17
Colo.	1	16	32	38	37	10	64	754	1: 12
Conn.	1	11	53	82	75	14	101	1,246	1: 12
Del.	—	—	6	2	—	3	5	110	1: 22
D. C.	—	—	21	24	25	5	29	652	1: 23
Fla.	—	—	34	38	67	13	51	781	1: 15
Ga.	—	—	24	18	38	6	24	841	1: 35
Idaho	—	—	10	7	10	—	7	238	1: 34
Ill.	—	—	97	237	295	15	252	6,856	1: 27
Ind.	1	55	3	19	69	—	19	1,940	1:102
Iowa	—	—	36	26	42	6	32	1,738	1: 54
Kan.	—	—	19	36	25	19	55	1,013	1: 18
Ky.	—	—	16	6	46	2	8	890	1:111
La.	1	75	20	33	39	1	109	925	1: 8
Maine	—	—	21	7	22	7	14	402	1: 28
Md.	—	—	2	32	35	—	32	765	1: 24
Mass.	3	171	106	141	195	—	312	3,161	1: 10
Mich.	—	—	89	49	195	25	74	3,006	1: 40
Minn.	—	—	44	52	99	—	52	2,161	1: 41
Miss.	—	—	5	8	20	—	8	372	1: 46
Mo.	—	—	67	48	120	18	66	2,629	1: 39
Mont.	—	—	10	11	24	3	14	307	1: 22

Dental laboratory technicians in training, July 10, 1947 (contd.)

State	Schools		Laboratories			Dental offices, number approved*	Total in training	Total dentists, 1941	Ratio of students to dentists
	Number approved	Enrollment	Number approved	Enrollment	Total number of laboratories				
Neb.	—	—	20	29	35	7	36	952	1: 26
Nev.	—	—	—	—	—	—	—	57	—
N. H.	—	—	1	13	25	—	13	238	1: 19
N. J.	4	451	86	495	261	9	955	2,992	1: 3
N. M.	—	—	5	3	5	—	3	132	1: 44
N. Y.	8	1,365	260	2,575	1,280	21	3,961	10,734	1: 2.7
N. C.	—	—	25	35	61	—	35	799	1: 23
N. D.	—	—	7	15	11	—	15	270	1: 18
Ohio	2	100	111	209	307	24	333	4,148	1: 12
Okla.	—	—	19	23	56	11	34	733	1: 22
Ore.	—	—	35	53	48	5	58	832	1: 14
Pa.	4	360	91	108	286	15	483	6,715	1: 14
R. I.	—	—	16	22	33	—	22	445	1: 20
S. C.	—	—	17	2	11	1	3	361	1:120
S. D.	—	—	7	13	8	4	17	300	1: 18
Tenn.	1	24	28	36	45	7	67	900	1: 13
Texas	1	25	84	35	96	39	99	2,148	1: 22
Utah	—	—	8	10	15	—	10	305	1: 30
Vt.	—	—	2	6	6	—	6	143	1: 23
Va.	1	125	13	35	38	8	168	890	1: 5
Wash.	—	—	64	46	71	6	52	1,024	1: 20
W. Va.	—	—	21	10	21	4	14	597	1: 42
Wis.	—	—	14	98	82	2	100	2,290	1: 23
Wyo.	—	—	6	5	7	1	6	118	1: 19
Totals	30	2,898	1,791	4,973	5,071	387	8,258	76,052	1: 9.2
Four states									
Mass.	3	171	106	141	195	—	312	3,161	1: 10
N. J.	4	451	86	495	261	9	955	2,992	1: 3
N. Y.	8	1,365	260	2,575	1,280	21	3,961	10,734	1: 2.7
Pa.	4	360	91	108	286	15	483	6,715	1: 14
Totals	19	2,347	543	3,319	2,022	45	5,711	23,602	1: 4
All other states									
	11	551	1,248	1,654	3,049	342	2,547	52,450	1:20.5

*One trainee estimated to each office.

PRESENT STATUS OF PROGRAM AT HARVARD SCHOOL OF DENTAL MEDICINE

James M. Dunning, D.D.S., M.P.H., Boston

Conceived in the belief that educational pioneering was necessary to bring about important advances in dentistry, the Harvard School of Dental Medicine opened its doors nearly six years ago. A five year course leading to both the medical and dental degrees was projected, and the first two years were spent largely in exploring the feasibility of such a plan. The School was given considerable publicity during that period, and when in 1943 for a number of reasons the five year, two degree feature of the plan was abandoned, President Conant's announcement of the fact also was widely circulated. Since then a process of steady evolution has occurred, and a policy of "deeds rather than words" has prevailed. Facts about the School have been released from time to time, but these appear to have received limited attention and a large number of persons both within and without the dental profession still do not know that the five year curriculum was abandoned and that the course is now one of four years leading to the D.M.D. degree. With the first class from the School just graduated, an up-to-date report may be in order.

The major educational policies implied in the five year plan are still adhered to, although the course leads to the D.M.D. degree alone. Although one object of the School is to turn out first class dental practitioners, an equally important aim is to fit men for careers in dental research and teaching. To accomplish these ends it is necessary that the students obtain a really thorough training in the basic medical sciences. Thus the students now spend their entire first and second years in the classes of the Harvard Medical School on exactly the same basis as medical students. They have full length courses in anatomy, physiology, biochemistry, bacteriology, pathology, pharmacology and physical diagnosis.

The advantages are great. In all of these courses the emphasis is on principles and methods of approach, so they are just as valuable to a dental as to a medical student. As a result, when the students arrive at the clinic floor, they are extraordinarily well grounded in the general architecture and function of the human body. The dental students speak the same language as the medical students and are accepted by the latter as fellows. The School is wiping out the difference to which Samuel W. Chase[1] of Western Reserve University referred when he said: "Until the time comes when dentistry attracts larger numbers of students with high scholastic ability, our dental classes cannot be taught at the same level as medical classes."

The plan to instruct students of the Harvard School of Dental Medicine for two years in the Medical School has been accompanied by several important, new and desirable administrative procedures. In the first place, applicants for admission to the School must be acceptable not only to an admissions subcommittee of the School of Dental Medicine but also to the admission committee of the Faculty of Medicine, which serves both the Medical School and the School of Dental Medicine. Entrance requirements, there-

Dean, Harvard School of Dental Medicine.

1. Chase, S. W., Comments Concerning Certain Topics. *Proc. Am. A. D. Schools* 23:89, 1946.

fore, are exactly the same as for the Medical School not only in quantity but also in quality. There is a great difference between stating similar entrance requirements on paper for the medical and dental schools and interpreting those requirements by the same quality standard. It would be a serious blow to the method of teaching at the School if any difference in quality between the medical and dental students were permitted, necessitating easier treatment for the dental group in the basic science courses. For this reason the students must also pass the same examinations and their records must be acted on throughout the entire first two years by the same teachers and promotion boards as handle the medical students. One result of this policy has been that the greatest care has had to be used in the selection of the students. Every type of available data is being used to sift applicants. Among other methods of selection there is a great interest in testing programs such as those being conducted by the graduate record office of the Carnegie Foundation and by the American Dental Association.

Students enrolled in the School of Dental Medicine may not transfer to the Medical School until after the dental degree has been obtained. If the graduates wish to return to the Medical School as third year students after completing their dental education, they may do so. There always has been a small professional group that has wished the two degrees regardless of the length of time needed to obtain them. From this group have come some of the best practitioners in the field of maxillofacial surgery and dental medicine. It is felt that it is a challenge to the dental profession to make dentistry so interesting that, if a choice is presented to these men on an opportunity basis, dentistry will win. It is much better to keep such men in the dental field by positive attraction than by giving them the unnecessary handicap of making them repeat their preclinical science in order to obtain a medical degree.

Revision of Teaching Methods

Many teaching methods have been revised in order to arrange the curriculum for clinical dentistry entirely within the third and fourth years, and, if the experience so far proves an indication of future trends, the graduates will be well equipped to meet their state board dental examinations and to enter the successful practice of clinical dentistry. Any deficiency which may result from a smaller number of rote repetitions of dental procedures is more than compensated for by increased versatility in the handling of new situations. The efficiency inherent in a large faculty-student ratio and a small clinic has been a tremendous help in accomplishing the curriculum change. Elimination of all nonessentials from the program of preclinical benchwork, a large amount of individual chairside instruction for each student and the substitution of seminars and group discussions for many of the conventional didactic lectures are among the educational features also utilized.

Seminars have been of particular interest since it is apparent that they teach the student to think for himself. In collaboration with a faculty adviser, the student prepares a talk of not more than one hour on some subject, for example, in the field of oral pathology or clinical dental practice. After the presentation, he leads a discussion in which both his classmates and the staff participate. The students are showing a surprising competence as essayists under such circumstances and appear to retain material better by virtue of the heightened personal interest.

The undergraduate dental curriculum is enriched also by a greatly increased program for dental research in which students participate and by the teaching of "dental medicine" along new lines.

The dental building on Longwood Avenue has been rebuilt to accommodate several large research laboratories. This expansion not only allows a much larger research staff than formerly but also brings into the dental building activities that formerly were located on medical school premises. The emphasis of the research program is on basic science, with studies now under way in the fields of endocrinology, nutrition, histology, pathology and physiology. Without making pedantic promises as to what this research program may be expected to accomplish, I may say that it is recognized as one of the major activities of the School and a large portion of the endowment of the School is allocated to it. Students have access to the laboratories for research projects of their own or for participation in projects being conducted by staff members. Some students receive casual employment out of hours in these laboratories, thus obtaining technical experience of some value and a slight addition to their income.

The development of dental medicine as a teaching subject involves the presence on the School staff of a man with both the M.D. and the D.M.D. degrees whose chief responsibility is to correlate clinical dentistry with the preclinical sciences and with clinical medicine. To this end he gives complete medical examinations to those dental clinic patients showing systemic symptoms of interest and also helps in the evaluation of the systemic effects of dental disease. He and other staff members give the students of the School access to valuable teaching material at the Massachusetts General Hospital and the Children's Hospital. Additional instruction in dental medicine and in its kindred subject, dental pediatrics, is given by the lecture and seminar methods.

Limitation of Class Size

One feature of the Harvard School of Dental Medicine which has caused considerable comment is the limitation of each class to fifteen students. The advantages inherent in having small classes at the present time are: 1. The preclinical facilities of the Medical School up to now have been such that the size of the joint class is limited. 2. A large amount of individual instruction can be accomplished best with a small class. 3. The seminar method operates better if the group discussing each essay is small. 4. A small class allows each student a far better opportunity to participate in research activities. 5. A small class favors educational research and facilitates a break with traditional methods if this becomes necessary.

The long range benefits to be obtained from maintaining a small sized class seem for these reasons to outweigh greatly the urge to increase the size of the classes. This does not mean that the School has no desire to turn out practitioners in quantity. It will take every opportunity to increase the size of its classes when it can do so without sacrificing the objectives just mentioned. One method for overcoming, to a small degree, the size limitations has presented itself already. The School can accept (and is accepting) into the third year class men who have had two or more years of training in an accredited medical school elsewhere. There are several "two year medical schools" where only the first two years of the medical curriculum are provided and the entire group transfers later to medical schools with larger clinical facilities.

If roughly 20 per cent of the dental needs of the country are being met by the graduates from existing dental schools, then the solving of the country's needs by quantity production alone would appear almost impossible. Although a much larger number of dentists would appear to be imperative to the country, at least for the next one or two decades, an intensive approach to the prevention of dental disease would appear to be even

more important. To that end it is felt that the type of research best called "basic" needs more emphasis. The teeth must be considered in their proper relation to human physiology, biochemistry, pathology and the like. The close liaison which exists between the research personnel of the School of Dental Medicine and that of the Medical School is illustrative of how closely their problems are interknit. In the course of this work, the School is contributing to the general pool of medical science and it is hoped that that pool will contribute solutions to many dental problems. The attack on dental disease has hardly begun. We cannot talk with much pride of our professional accomplishments until we can point to sharply dropping incidence curves similar to those the medical and public health workers have produced in even such complex diseases as tuberculosis. No school, institute or money granting agency can state with assurance that it will be able to produce research results on order, but all students of the problem are agreed that research thrives best in a climate where time, security and equipment are available and a cross fertilization of ideas can take place. The Harvard School of Dental Medicine is attempting to take a step forward in the production of such a climate.

Administrative Status

Members of the dental profession who fear that the Harvard School of Dental Medicine has lost its autonomy should know that in an administrative sense the School enjoys, if anything, a better status than did the old Harvard Dental School from the year 1899 when the staffs of the medical and dental schools merged to form the Faculty of Medicine. The important change in this regard is that the School of Dental Medicine now has exactly the same basis for representation as the Medical School at the meetings of the Committee of Professors and the Faculty of Medicine. It has the title of dean for the administrative head, and that officer is also associate dean of the Faculty of Medicine. It has a budget of its own published separately in the report of the treasurer of the University and under its own control. Subject only to a broad university pattern, it has freedom to select its own staff, and the teachers have the freedom to teach as they wish. In both these matters, the School receives assistance rather than restriction from the authorities of the Medical School and of the University.

The Harvard pattern is not suggested as one to be followed immediately and in full by all the dental schools in the country. Schools in which the main object is the training of dental practitioners in quantity will of necessity adopt a somewhat different approach, although even in these schools it is hoped that some of the methods being developed will prove applicable. As the objectives of the dental profession become more mature and diverse, the need for a single blueprint for all the dental schools throughout the country may largely disappear. Schools of a great variety of types may in the end contribute to the advancing profession. No school can expect to furnish a student's entire professional education in four years. If the student does not continue to supplement his undergraduate education during his years of internship and of practice, he can never prove a credit to any profession. This is an additional reason for thinking that there may be room for more than one type of dental school in this country.

Accomplishments

Now for actual accomplishments. Perhaps the greatest has been the "shaking down" of a new staff into a good teaching team. A small group of teachers from the former staff of the Dental School has been augmented by additions, mostly of young men from schools elsewhere in the

country. The aim of this group has been to develop the new curriculum with an open mind and also with due regard to the accomplishments of past years. Meetings of the staff and curriculum committee have been frequent. Actual contact with the students of the first two classes has crystallized into a workable form the plans laid at these meetings. A sense of team play has resulted in which every member of the staff has been able to share. The School graduated its first class on June 5, 1947. Of the seven men in the class, four are entering the field of dentistry immediately: two as practitioners (both with half time teaching positions in local dental schools), one as a dental intern and one as a dental officer in the United States Navy. The other three are continuing their *dental* education by returning to the Medical School as third year students. I say "dental" because all have avowed their intentions of remaining in the field of dentistry through maxillofacial surgery, research or teaching. All have taken and passed their state board dental examinations in the states of their choice: Massachusetts, New York and Connecticut.

Research

In the field of research, a well integrated team of full time workers is now getting under way. The chief emphasis of this group is on basic research in dental science: the study of causes operating throughout the entire body rather than the study of effects alone as found in the mouth. Chemical and histochemical studies are being made of enzyme alkaline phosphatase essential to the deposition of calcium in both bones and teeth. New methods have been developed to observe for the first time the distribution and localization of this enzyme in various body structures throughout their developmental history. Studies of the parathyroid gland and adrenal cortex have yielded additional information on the functions of both of these glands and on the relation of the former to tooth formation.

In the field of nutrition, efforts are being made to standardize strains of rodents susceptible to tooth decay when maintained on purified diets. The procedures used are more accurate for the study of diet in relation to dental decay than the procedures which were available formerly. Work is progressing on the formation of a primate colony for nutrition experiments; rhesus monkeys, ringtail monkeys and marmosets are included. Experimental work is under way to test in animals the effect of prenatal diet on dental caries in the offspring. An attempt is being made to determine if an unrecognized factor or combination of factors beneficial to the developing teeth is present in natural foods.

Histologic study of the enamel of the teeth has been extended by the application of two new methods permitting much improved vision of both the inorganic and organic structures in this tissue. Radio isotope and electron microscope studies are being planned for further investigation of the organic elements of the enamel. Studies are under way on the physiology of saliva. Controlled biochemical methods are being developed for reproduction of dental caries *in vitro*. Research among patients is not neglected, but it is in much earlier stages of development. A group of patients has been formed for intensive study of nutrition combined with dental study and dental care.

An indication of the breadth of the program may be found in the fact that members of the staff have recently published articles not only in the *Journal of Dental Research* and other dental journals, but also in the *Journal of Biological Chemistry*, the *Journal of Nutrition*, the *Archives of Biochemistry*, the *American Journal of Anatomy*, *Endocrinology*, the *Proceedings of the Society of Experimental Biology and Medicine*, the *Anatomical Record* and *Science*.

These results and many less tangible ones lead me to believe that the Harvard School of Dental Medicine is off to a good start.

COUNCIL ON DENTAL THERAPEUTICS

COUNCIL FINDS STYPTENE NOT ACCEPTABLE

STYPTENE (Styptene Dental Mfg. Co., New York) is distributed to the dental profession as a hemostatic, astringent, antiseptic and topical anesthetic.

Styptene is stated to have the following composition: salicylaldehyde, 4 per cent; cresol, 1 per cent; tannin, 5 per cent; menthol, 5 per cent; orthohydroxybenzoic acid, 5 per cent, and isopropyl alcohol, 80 per cent.

Evidence to demonstrate adequately the effect of Styptene on oral tissues or to justify the complex composition of the product has not been submitted. The name Styptene is therapeutically suggestive. For these reasons, the Council on Dental Therapeutics has declared Styptene not acceptable for Accepted Dental Remedies.

COUNCIL LISTS PRODUCTS FOR "ACCEPTED DENTAL REMEDIES"

THE Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following products in the list of Accepted Dental Remedies:

Penicillin and Streptomycin[1]

Penicillin (Calcium) in Oil and Wax —Abbott: 300,000 units per cubic centimeter in B-D[2] 1-cc. glass cartridges with B-D Disposable Cartridge Syringe; and in B-D 1-cc. cartridges, with flushing fluid (benzyl alcohol 1½ per cent in isotonic sodium chloride solution), for use in B-D Cartridge Syringe. Calcium penicillin suspended in peanut oil containing 4.8 per cent (w/v) white wax, U.S.P. Manufactured by Abbott Laboratories, North Chicago, Ill.

Fluorine-Containing Substances[3]

Sodium Fluoride C.P. Powder, A.C.S.: A brand of sodium fluoride. Manufactured by the J. T. Baker Chemical Company, Phillipsburg, N. J.

1. A.D.R., Ed. 13, p. 104.
2. Trademark registered by Becton, Dickinson & Company.
3. A.D.R., Ed. 13, p. 78.

Admission of a product to the list of Accepted Dental Remedies means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics which is available upon request, and inquiries are welcomed.—*Donald A. Wallace, Secretary.*

COMMITTEE ON LEGISLATION

TESTIMONY OF AMERICAN DENTAL ASSOCIATION AT HEARINGS ON NATIONAL HEALTH BILL, S.545

THE Subcommittee on Health of the Senate Committee on Labor and Public Welfare held hearings during May and June on the National Health Bill, S.545, which was introduced into the Eightieth Congress by Senators Taft, Smith, Ball and Donnell.

At the hearing Carl O. Flagstad, chairman of the Committee on Legislation of the American Dental Association, presented a formal statement in which he emphasized the need for dental research and suggested that S.545 be amended to give the individual states greater freedom to develop an optimum state-wide dental health program in accordance with existing dental personnel and facilities.[1]

The oral testimony given on cross-examination by Dr. Flagstad on behalf of the American Dental Association is as follows:

Senator Smith. Doctor, there is a problem, as you present in your statement, that it seems to me it would be important to consider. Right in the beginning, on page 1, you say there are 78,000 dentists registered in the United States. We have a population in the United States of approximately 140,000,000 people. That suggests that we are terribly undermanned in this whole field, and I am wondering what the thinking of your association has been along the line of picking up that lack of dentists that we need for an over-all national program which, I think, we all agree is desirable. In other words, that can't be accomplished simply by spending money. You have to get the personnel and they have to be screened and they have to be educated, and we have to think in terms of a pretty broad program to train them, and we need, of course, years to develop this adequate program. Am I correct in that?

Dr. Flagstad. That fact has been brought out in our statement. We feel at the present time that our manpower is somewhat limited. However, efforts are being made to overcome it by increased attendance in our dental schools (there have been created some new dental schools) and perhaps by the greater use of auxiliary help such as dental hygienists who can be used in much of this inspection work. They are being used now in some communities where these programs are in effect. We also advocate limiting the program to the ability of the community to carry it out.

Senator Smith. Let me ask you this: You emphasize—and I think you do so correctly—that the first attention should be given to the

1. Testimony of American Dental Association at Hearings on National Health Bill, S.545. *J.A.D.A.* 35:216 (August 1) 1947.

children in school—that the children should get dental inspection. I agree with you on that. Can you deal with that problem with any other than the best-trained dentists? Can you rely upon partly trained people to cover the ground in that respect—people working under the direction of a dentist in that area?

Dr. Flagstad. We cannot deal with what you term "partly trained" people, but we do have professional help in the dental profession, dental hygienists, who are trained in this particular respect and are being used somewhat in the schools now in many programs. We have a man with us today who can discuss for you such a program which is in operation. We contemplate that the hygienists would have to have supervision and that in many of the places dentists would be used to a great extent. But the hygienists can be augmented by other professionally trained help, not people that you can pick up. We can also perhaps train some of our county nurses who are now being used in the county for health services.

Senator Smith. They would probably be the type of person who could say that this difficulty exists, but they wouldn't be qualified to treat the child.

Dr. Flagstad. They would be used in the inspection program chiefly, not in the dental-care program. The dental-care program is entirely in the hands of the dentist. Nobody is qualified or legalized to do that except the dentist.

Senator Smith. Of course, in the field of dental care, 78,000 dentists for our entire population is grossly inadequate. I am thinking now in terms of how to build that up in an over-all national program.

Dr. Flagstad. We recognize that.

Senator Smith. I notice that you favor a department of health. There has been a bill entered to establish, I believe it is called the Department of Public Welfare, which would include health, social security and all welfare matters. Are you one of those who feel that a separate department of health is desirable and should not be combined with these others?

Dr. Flagstad. We offered testimony when hearings were held on those bills. We are on record as favoring a department of health without combining with the other two agencies which were included in those particular bills.

Senator Smith. And you recommend an assistant secretary of health to have charge of the national dental program——

Dr. Flagstad. To be director of dental care or dental health, whichever you wish to call it.

Senator Smith. In the field of research, which interests me a great deal. I have always been interested in that field. We have just passed in the Senate the Scientific Research Foundation which has a division of medical research, and it is contemplated in the development of that division, if the science bill goes through, that we would have a branch, I assume, under medical or dental research. I am wondering whether it isn't better to put them all under headings: cancer, heart disease, etc. Wouldn't it be best to develop our research under that heading rather than to have a separate bill for dental research?

Dr. Flagstad. I am not familiar with the bill and the plan. I would say this, however, that dentistry has felt for a number of years that in receiving its allotments from medical funds it has always suffered and has not received its fair share. We want funds earmarked definitely for dentistry. Senator Murray, a member of your committee, has been very helpful and very active in the last few years in helping us introduce such types of bills, and S. 176 and also title IX of this bill are on that basis, to get the funds earmarked for dentistry. Our funds so far have simply been funds which have been given to us through the generosity of medicine. We want an institution of our own at Bethesda where we can carry on dental research, and that is the purpose of the present bill in Congress and the purpose of the bill that was in the Seventy-Ninth Congress. The bill, S. 176, now carries the names of quite a number of the men on this committee.

Senator Smith. Now you refer in your statement to dental health education. That doesn't mean inspection of children, but it means educating people from childhood up as to the importance of the care of the teeth. Is that your idea?

Dr. Flagstad. That is the idea: programs of lectures on dental health to the children. There are some such programs in operation now giving information concerning dental health, some training in the care of their teeth and also programs to parents and teachers' associations and dental health publicity in the proper places. The dissemination of the proper kind of information re-

garding the problem of dental health is a motivating force to stimulate people to care for their teeth.

Dental inspection without some of this dental health education would be useless. Some of these programs which are in effect perform the dental inspection and inform the parent regarding the child's condition. Then there is a follow-up program where the child goes to the dentist and returns showing that the teeth have been taken care of. Such programs are what constitute dental health education, Senator.

Senator Smith. Would it be your thought that that would be taught in public schools?

Dr. Flagstad. Part of it would be taught in public schools and part of it would be taught in organizations, wherever we can get favorable publicity in the right place.

Senator Smith. Wouldn't such hygiene and health be part of the education of the child's upbringing, part of the whole program?

Dr. Flagstad. It would not, unless you set it up as a separate arrangement in the schools. It will not receive the attention that it should receive.

Senator Smith. Wouldn't that be more a problem for the public schools in the various states to develop under the advice of an organization like yours? It wouldn't be a matter for federal legislation. It would just be part of an over-all policy, I take it.

Dr. Flagstad. To interest schools in putting on programs of that kind?

Senator Smith. I am just wondering how to deal with it.

Dr. Flagstad. We feel that if money is available for this particular purpose and it is matched by funds from the state and the community it will encourage the development of dental health education programs within the schools and outside the schools. Our point is to get the message over to the people.

Senator Smith. Would you suggest that programs of that kind be under the Public Health Service, where I understand they are at the present time, or under the proposed dental setup in S. 545? Can the Public Health Service handle that, do you think, or should we have a special provision?

Dr. Flagstad. The Public Health Service has to some extent at the present time. My thought would be that this would augment the Public Health Service program and that we would have trained people who could present it and who would be definitely assigned for that particular purpose. In our schools in Minneapolis we have such a program. We have trained a group of dental hygienists who give lectures to the school children to carry on a follow-up program. They are not under the Public Health Service, but under the board of education with a dentist as director, and I think they are efficient, particularly in meeting the needs of the schools.

Senator Smith. Well, Doctor, I would like to ask you one further question on this whole situation and that is this: Isn't it a fact that we are experimenting, you might say, in this new field; that we are trying to find ways and means of meeting this over-all national health situation, including the dental care of the children? Is it wiser to try to blueprint a plan for the whole country or is it wiser to encourage the states to institute their own programs? I notice you emphasize that, if the plans were left to the states, a variation in the development of plans might result. Would that variation be desirable as giving us experience in trying different approaches which will aim ultimately, of course, in getting an over-all program that would meet all our needs?

Dr. Flagstad. I think it is impossible to develop a national program that will fit into every place in the United States. We are on record in the hearings last year and are on record now that we are for community design of the program, absolute community design, and supervision of the program. There is a difference in different counties. The condition in Minnesota is entirely different from that in Mississippi. A program set up for us would not be a desirable program for those in that section of the country. The country varies, so that I can't see how a federal program can be set up. We are pleading for community and state control of the program.

Senator Smith. And you think it is better to have a plan for grants-in-aid to the states to develop their own programs than to have an over-all program?

Dr. Flagstad. Yes, that is right.

Senator Smith. Now I notice you don't approve of the principle of compulsory health insurance. Is that because you don't think we are prepared yet to deliver the goods, so to speak, for the pay-roll deductions that might be made?

Dr. Flagstad. Our testimony on that subject is

in the hearings on S. 1606, and I think that covers it very well. The American Dental Association hasn't as yet changed its views. We haven't had a chance to study the new bill that is just out, and I am not prepared to pass judgment on the new bill.

Senator Smith. Senator Murray just filed a new bill.

Dr. Flagstad. I have seen the bill.

Senator Smith. You have seen the bill?

Dr. Flagstad. Yes; I have seen the bill.

Senator Smith. Now, I gather that you feel that from the terms of our bill, which call for readjusting these things in a five-year period, in the dental field at least that is too short a period to mobilize your resources, so you would like to have a further extension of time in developing this program.

Dr. Flagstad. Yes; and we would like to remove the limitations in the specific requirement.

Senator Smith. I think the object in putting in the time limitation is to try to speed the program up so that we would move as rapidly as possible in developing the state programs. I don't think it is the purpose to say if you have got a good reason for not having done it, we aren't going to give you a greater chance, but I think probably in your field you would need more time than they might need in the straight health field.

Dr. Flagstad. There are some states that could do it but they are very few. It will be a new venture in many states to have a state-wide program. We have many programs somewhat of this type, and they carry on very well. However, they are local. But there are very few places where we have a state-wide program. We do have one state which has a state-wide program but not as extensive as suggested in this bill. We have asked for the privilege of setting the age and we have also asked for the privilege of setting up the program in accordance with the community's ability to carry out the program.

I can appreciate the idea of the committee to speed this thing up and to encourage states to undertake this program and get it under way as rapidly as possible. That is a good idea as sometimes I think we need that type of prodding. However, we feel that if the states were given a little more latitude by removing the time period entirely, it would encourage them to undertake the program.

Senator Smith. Senator Murray, have you some questions you would like to ask?

Senator Murray. Yes. Doctor, we are all very well acquainted with you. You have testified on several occasions, in connection with the national compulsory health bill and also in connection with the dental research bill. The dental research measure is a measure which has been proposed by the American Dental Association. I understand it was the result of very extensive studies of your organization——

Dr. Flagstad. That is right.

Senator Murray. And the bill as filed was entirely in conformity to the requirements of the American Dental Association——

Dr. Flagstad. That is right.

Senator Murray. And had the approval of your organization.

Dr. Flagstad. That is right, Senator.

Senator Murray. The bill passed here in the Senate before. It was reported favorably by the committee after closed hearings and passed in the Senate, but was lost in the House.

Dr. Flagstad. I don't think it was lost in the House, Senator. It died in the House.

Senator Murray. It got lost in the shuffle at the tail end of the shuffle there.

Dr. Flagstad. There is a little difference between lost and died.

Senator Murray. That is right. But I think it is very much alive, because since that time the bill has the honor of being sponsored now by several very distinguished members of the majority party in this Congress. Senator Taft is on the bill and Senator Morse and Senator Aiken, and I believe it is universally accepted by both parties in the Congress and by the American people who have investigated it. They realize that it is a most important measure for the welfare of the people of this country and we are all very anxious to see it, and I am very glad to note that you recommend it be passed now and not be held back on account of the danger that other legislation might not pass.

Dr. Flagstad. Senator Murray, the American Dental Association favors the immediate passage of S. 176. We feel that it is the greatest advance that we can make in dental health as we will get dental health research rolling along in the proper environment.

The point I wished to make about it not being lost, Senator, is this, that I believe the House was favorable. The bill passed the Senate in the last few days of the Seventy-

Ninth Session and there was considerable legislation of necessity you had to complete, and consequently the House didn't have time to consider it. I want to thank Senator Murray. He has been very active in helping us with this dental research bill. The history of our efforts goes back quite a number of years and always he has been interested.

Senator Murray. I must say that my work was really based on the aid that the American Dental Association gave us in connection with that proposal, and I am satisfied, as I said a moment ago, that the Congress generally is in favor of that bill. Now in connection with the national compulsory health insurance bill, you say you have seen a copy of the new bill which has been filed?

Dr. Flagstad. That is about all, Senator. I have seen a copy.

Senator Murray. You know it undertakes to decentralize the administration.

Dr. Flagstad. I read your press release.

Senator Murray. And I think it complies with your suggestions made here today with reference to allowing the states to set up the programs and to have more latitude in managing programs of that kind.

Now it seems to me, as you have said a moment ago, that it is difficult to have a comprehensive program that would apply satisfactorily in each state in the Union. If each state is permitted to operate on its own basis, some states may develop excellent ideas that will subsequently be accepted by other states, and I think it is a very advisable method of handling the proposition by decentralizing the administration of the program. The present bill undertakes to do that, and I hope you will be able to give it your most careful study.

Dr. Flagstad. May I say this, Senator, that I am not authorized to speak on the present bill. The American Dental Association is on record as being opposed to compulsory health insurance. Whether this bill will change their attitude, I do not know. We have a meeting in August and the bill will be discussed.

Senator Murray. Well, the new bill was based upon the criticisms that were made against it before, and we undertook to obviate those objections and to provide a bill that would meet with the requirements announced during the time the hearings were on.

Senator Donnell. May I ask the Senator a question, please?

Senator Smith. Senator Donnell.

Senator Donnell. Does S. 1320, the new bill, abandon the principle of compulsory health insurance?

Senator Murray. No.

Senator Donnell. It still maintains that principle?

Senator Murray. It still maintains it. The principal objection to it heretofore was the centralization of the administration, and that was one of the things that the American Dental Association, as I understand it, felt was a very serious obstacle in the bill.

Dr. Flagstad. That is right, but the association is also on record as being opposed to compulsory health insurance. I don't know whether the members will change their minds in connection with studying this bill. At the present time, we are committed to opposing that type of legislation.

Senator Murray. Anyway, that bill is not before us at the present time, but I was merely calling your attention to the new bill.

Dr. Flagstad. Yes; I think every bill that has been presented is an improvement over the bill that has gone before.

Senator Murray. That is right. It was a very difficult program to present and it had the same experience in other parts of the world. I assume if it ever becomes a law, it will naturally be improved and it will be perfected as it goes along.

Dr. Flagstad. I think the point you make about states trying out programs and getting information that is helpful to other states is fine. If we started out on a program as suggested in S. 545, we would have to take some of the experience of the states or local communities which are now carrying on programs similar to the one proposed in S. 545.

Senator Murray. With reference to the bill which is now before us—S. 545—your figures show that the entire $20,000,000 appropriated for this bill as a maximum for dental services in any year matched with state funds would not be able to provide sufficient funds for adequate care of children. Is that true?

Dr. Flagstad. I think that, in general, is true. It is the reason we are asking for some permissive arrangements to change the program so that we can serve to the extent to which we can deliver the service and set up programs within our ability to perform. Just where we would change the program I don't know. It would depend considerably on the locality.

Senator Murray. But you do believe, under the bill providing for only $20,000,000 to be matched by the state, which would allow only approximately $1.50 per child on the average, that that would be sufficient to take care of the situation?

Dr. Flagstad. We think that that would be a very good beginning if we can have some permissive arrangement as to the amount of dental care we are going to include in our program. The program now includes elementary and secondary schools. It might be necessary to cut down on the secondary-school proposition.

Senator Murray. I notice in the table here that in Montana it would allow only 90 cents per child for dental care.

Dr. Flagstad. The bill doesn't at the present time provide for all children even as it was written, Senator, because it provides definitely only for school children. It doesn't provide for all children—preschool children and those who are not in the schools.

Senator Murray. Your organization has gone on record heretofore against the idea of a means test in furnishing dental care and medical care. Isn't that true, Doctor?

Dr. Flagstad. Our organization has not made a public statement to that effect, Senator. We are not in favor of applying the method federally. We are in favor of limiting at the present time the dental care to those who are unable to pay. The method of determining who shall receive this care should be entirely within the province of the community and the state and must not be tampered with by the government. May I read again from my statement?—

The responsibility for providing dental care must be borne in the same manner as the responsibility for providing food, shelter, or any other essential of life. It is the American custom and tradition for the individual to attempt to supply these things for himself. If he cannot do so, the responsibility falls on the family, the community, the state, and the Nation successively. If each assumes an equitable share of responsibility, the problem of better dental health in this country is on the way to solution.

We believe in the democratic way, that if the people can take care of themselves, they should do so. We are in favor of taking care of those who are unable to pay.

Senator Murray. Are you in accordance with the resolution passed by the house of delegates of the American Dental Association which opposed the establishment of a means test at the federal level in a program of dental care, holding that the desirability of such test should be determined at the state level?

Dr. Flagstad. We are in favor of local determination of who shall be entitled to dental care, whether it be the community or the state.

Senator Donnell. Senator Murray, would you mind just holding that quotation from that resolution so that we might have it when Dr. Mead is on the stand?

Senator Murray. Yes; now do you think that any person who would have the administration of the dental program should be a dentist?

Dr. Flagstad. That is right.

Senator Murray. And you believe that the dental research program should be under the direction and control of the dental profession?

Dr. Flagstad. Yes; under the Public Health Service. It is placed in the Public Health Service, as you know in S. 176, and if I understand this bill, S. 545, the control is still in the Public Health Service. We have a dental director in the Public Health Service whose department would administer the research program.

Senator Smith. Senator Donnell.

Senator Donnell. Doctor, the American Dental Association for which you appear has been flourishing in the last year and it has made a very material increase in its membership; has it not?

Dr. Flagstad. That is right.

Senator Donnell. You had 56,000 last year and you have 63,000 now, and of the two-thirds of the dentists registered, that is, registered dentists represented by your organization last year, you now have 80 per cent. That is correct; is it not?

Dr. Flagstad. That is the registered dentists. Seventy-eight thousand doesn't represent all the practicing dentists. There are many dentists registered who are not practicing because of age and other things.

Senator Donnell. The point I am making is that the American Dental Association is thriving and, in your judgment, fairly represents the opinion of the dental profession of the country. That is right; is it not?

Dr. Flagstad. That is right.

Senator Donnell. You referred last year in your

testimony, which you made mention of this morning, as follows: With respect to the pattern of organization, you said this democratic pattern of organization with extensive membership in every state in the Union unquestionably gives the American Dental Association the right to voice the opinion of the great majority of dentists in the United States. Do you still adhere to that judgment?

Dr. Flagstad. That is right; I still do.

Senator Donnell. Now, Doctor, just a moment or two on one or two preliminary matters. Your experience has been over a period of some thirty-six years in private practice; has it not?

Dr. Flagstad. That is right.

Senator Donnell. And you refer to being on the faculty of the University of Minnesota. You didn't state perhaps quite fully the fact that not only are you a professor but also you are chairman of the department of prosthetic dentistry at the University of Minnesota.

Dr. Flagstad. That is right.

Senator Donnell. Now, Doctor, I want to ask you this: On page 3 of your statement which you have presented to us this morning, you quote from the hearings last year on S. 1606. You quote this language:

The American Dental Association believes this—

and I interpolate that by the word "this" you are referring to the grants-in-aid system; and resuming the quotation—

system should be enlarged to meet all health needs and that there is no necessity for enacting a national compulsory prepayment plan.

Do you still adhere to that view, Doctor?

Dr. Flagstad. The American Dental Association hasn't changed its point of view. This is definite instructions from the house of delegates.

Senator Donnell. Does your personal judgment in any sense differ from the quotation which I have called to your attention?

Dr. Flagstad. No; it does not.

Senator Donnell. Do you believe and adhere to that just as much today as you did on April 21, 1946, when you were here?

Dr. Flagstad. That is right.

Senator Donnell. Doctor, on page 10 of your statement today, you have this to say:

The American Dental Association is of the opinion that a federal grants-in-aid system to states for health programs is desirable and effective.

Now I ask you as distinguished from the association and referring now to your own personal opinion, do you concur in that opinion that a federal grants-in-aid system to states for health programs is desirable and effective?

Dr. Flagstad. Yes; I do.

Senator Donnell. Now I call your attention to page 11 of your testimony where you say:

The American Dental Association endorses the nonprofit voluntary prepayment plan for the distribution of health service—

and so forth.

Do you personally, as distinguished from the association, concur in the endorsement of the nonprofit voluntary prepayment plan for the distribution of health services?

Dr. Flagstad. Yes. Unfortunately, in dentistry, it has been very difficult to set up, and we have not made the progress we should like to have made. I think you have had testimony from the Medical Association indicating that it is operating quite successfully in medicine in many sections of the country.

Senator Donnell. But both you personally and the American Dental Association do endorse the nonprofit voluntary prepayment plan for the distribution of health services?

Dr. Flagstad. Yes, sir; and we are on record.

Senator Donnell. And it is your present view today just as much as it has been in the past. Is that right?

Dr. Flagstad. Yes; that is right.

Senator Donnell. Now Doctor, referring to your testimony of last year when you were here, Senator Smith this morning raised the question whether you think it is advisable to put into effect the national system all at once or whether you favor what he has more than once referred to here and elsewhere as the guinea pig experimental type of approach. Now I call to your attention this language in your testimony of last year in which as I understand it, you are in accord exactly with what you said this morning.

On page 1020, you say:

The American Dental Association believes that compulsory health insurance for a majority of the population should not be established in this country without preliminary scientific experimentation involving less extensive groups of the population.

Now do you still adhere to that view that is expressed in your testimony of last year,

both you personally and the American Dental Association, so far as you know?

Dr. Flagstad. Yes, sir.

Senator Donnell. Now in your testimony of last year, on the same page, you say this:

The American Dental Association believes that the grants-in-aid system has been effective in meeting certain health needs under the Social Security Act. The American Dental Association believes that this system should be enlarged to meet all health needs and that there is no necessity for enacting a national compulsory prepayment plan.

Do you still adhere to that viewpoint personally?

Dr. Flagstad. Yes, sir. That is the same as in our present statement.

Senator Donnell. That is the same as is quoted identically in your statement today. Doctor, I think it was Patrick Henry who said that he knew of no better lamp to guide one's feet than that of experience.

I ask you in referring to your testimony of last year whether you in any sense have changed your view as expressed on page 1022, which is as follows:

Experience in foreign countries reveals that effective dental health programs have not been developed under the compulsory health insurance system.

Do you still adhere to that view?

Dr. Flagstad. Yes, we do; and further studies have been made and we have further evidence to substantiate that statement.

Senator Donnell. Now, in your testimony last year, you elaborated somewhat on that statement and you said this, and I want you to listen to this, please, and tell us whether or not you still adhere to this view on page 1023:

The following short quotations are taken from the report of an official committee of Parliament appointed to study the British dental program:

"Roughly two-thirds of the insured population, that is between 13 and 14 million people, are entitled to dental benefit, but only 800,000 (less than 7 per cent) of these claim it on an average each year."

It is the contention of the American Dental Association that there is something intrinsically wrong with a program which compels 13 or 14 million people to contribute for a service which only 800,000 receive.

Another quotation from the committee's report:

"The state of the dental health of our population," that is the British population, I take it, "and its effect on their general health is bad." Then you continue with your own statement of last year:

The American Dental Association does not believe that any program which must make such an admission after several decades of existence gives any indication that it will aid in rearing a generation of adults less afflicted with dental disease.

Perhaps it might be impressive to add the general opinion expressed by our veterans of the Dental Corps stationed in England during the war. Their opinion is: "The dental health of the people of England is very poor and so is their dentistry."

Do you still adhere, Doctor, to those quotations which I have read from your testimony of last year?

Dr. Flagstad. Yes, sir, Senator.

Senator Donnell. Now Doctor, I call to your attention the book by Mr. Herman Levy, you are familiar with that book, are you not, on national health insurance?

Dr. Flagstad. I am not.

Senator Donnell. For the purpose of the record, I would like to read one sentence from page 154 of this book. This is published under the University Press of Cambridge—that is English Cambridge, 1944, and reads as follows, under the heading of Dental and Ophthalmic Service:

Less than 10 percent of the insured population eligible for dental benefits applied for them in any year.

Now that seems to corroborate your general statistics set forth in your testimony of last year. And you still adhere to the same observations with respect to experience?

Dr. Flagstad. Yes, sir, Senator.

Senator Donnell. And you put a value likewise obviously on experience in determining whether or not compulsory health insurance is advisable?

Dr. Flagstad. Yes, sir.

Senator Donnell. Now, Doctor, I call also to your attention this statement which appears in your testimony of last year on page 1024:

This series—

that is the series of advantages of the legislation which your association has proposed over the bill S. 1606 of last year, of which S. 1320 is a lineal descendant, I should say, having many characteristics of its parents, grand-

parents and great-grandparents—

could be continued at great length, but I believe the point has been made; the American Dental Association is opposed to the enactment of S. 1606 because it is not good legislation for improving dental health.

Do you still adhere to that view, Doctor?

Dr. Flagstad. Yes; I do.

Senator Donnell. Last year we had the benefit of hearing from Dr. Gruebbel. You presented Dr. Gruebbel, I think, did you not, last year?

Dr. Flagstad. Yes; we did.

Senator Donnell. Would you mind stating just who Dr. Gruebbel is?

Dr. Flagstad. He is the secretary to the Council on Dental Health of the American Dental Association. He is a full-time employee of the American Dental Association and makes it his business to study the dental health situation and help with the development of dental health programs throughout the United States.

Senator Donnell. Now, bearing in mind the question propounded to you a little while ago by Senator Smith on the advisability of the inauguration, on the one hand, of a vast national system or, on the other hand, a community experiment, I read to you this portion of a paragraph from Dr. Gruebbel's testimony last year on page 1027 and ask you whether you concur in the views expressed by him. He is referring here to Senate bill 1099. He says:

It is primarily a grant-in-aid bill to provide dental services on an experimental basis on a community level. We believe that past experience shows that such programs, developed on a community basis and designed to meet the need in the community itself, can be very effective. We do not believe that there is any evidence to show that a compulsory health system will do that, because the conditions in the various communities are so different. You cannot, in our estimation, have one blanket program on a national basis which will fit every community, because the circumstances and needs are so very different in the various communities.

Do you concur, Doctor, in this statement of Dr. Gruebbel's of last year?

Dr. Flagstad. I do; and I have practically said that in answer to Senator Murray's question.

Senator Donnell. Now, I have only one or two other questions, and they are these. Last year you called upon the editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, Dr. Harold Hillenbrand, to answer a certain question. Do you know Dr. Hillenbrand?

Dr. Flagstad. Yes, sir. He is now general secretary of the American Dental Association.

Senator Donnell. Now, he is a man of high standing, I judge, and has the confidence of the members of the dental profession?

Dr. Flagstad. Yes, sir. He had the confidence of the dental profession to the extent of being elected their secretary. It is perhaps the most responsible position we have to offer in the dental association.

Senator Donnell. On page 1035 there was this question propounded to him. The question was:

Dr. Hillenbrand, do you favor the following of a plan of national compulsory health insurance in the administration of dentistry throughout the country?

Dr. Hillenbrand replied, "No; I do not."

I will ask you whether or not you, Doctor, yourself, favor a plan of national compulsory health insurance in the administration of dentistry throughout the country?

Dr. Flagstad. I do not.

Senator Donnell. That is all.

Senator Smith. Senator Pepper?

Senator Murray. I would like to ask a few questions before I leave. Doctor, you say there is no better way to guide your feet than by the experience of the past. What is the experience of the past with reference to adequate dental care in this country without any programs?

Dr. Flagstad. The American Dental Association recognizes that there is not adequate dental care at the present time. Is that what you wish?

Senator Murray. Yes; and there is a very extreme deficiency of dental care in the country.

Dr. Flagstad. Yes, sir. I think we are all interested in the same problems to try to find a way to take care of this inadequacy.

Senator Murray. The lack of adequate dental care in this country has been so extreme that it would be impossible now to take care of the needs of the country with the present personnel of the dental profession, wouldn't it?

Dr. Flagstad. Yes, sir. I think we are all interested in the same association.

Senator Murray. Now, with reference to the nonprofit voluntary systems of medical care or dental care that are only in the stage of

experiment at the present time, if it should develop that these voluntary systems will prove inadequate, then do you think some other method should be considered if, under the voluntary system, it is going to be impossible to provide adequate medical care? Would you think then that some other method should be considered?

Dr. Flagstad. We believe, in addition to that, that other methods are necessary. We are particularly interested in the children, and it seems to us that the program offered by S. 545 makes an attack on the problem and we want to make it within the possibility of performance. That is why we are suggesting the amendment.

Senator Murray. What percentage of Americans today are getting adequate dental care?

Dr. Flagstad. I couldn't say offhand. Perhaps Dr. Mead, the president of the American Dental Association, can answer that. We might state, Senator, that food and clothing are inadequate at the present time, too. It is a good comparison, and we have many methods of trying to provide adequate food and clothing but haven't discovered a satisfactory means, and the same thing is true of medical care.

Senator Murray. But in the case of dentistry, only a very small percentage of the total population is really getting adequate dental care. Is that right?

Dr. Flagstad. I think the statement is true to a degree as a considerable portion of the population is receiving adequate dental care.

Senator Murray. That was the same situation in England, was it not?

Dr. Flagstad. At the present time?

Senator Murray. Yes, and at all times in the past.

Dr. Flagstad. But they are not getting adequate care under the compulsory health insurance plan, either.

Senator Murray. Well, I am not dwelling on that at the moment. The history of England has been that the people there failed to get any substantial degree of dental care. My understanding from reading is that in England thirty or forty years ago, the people there, because of the absence of adequate dental care, were losing their teeth at an early age and the women of England at the age of 30 were without teeth. The situation there was appalling with reference to the lack not only of dental but also medical care.

Dr. Flagstad. Compulsory health insurance has not improved it.

Senator Murray. Well, that remains to be seen. It has been in operation only a little while. Such a claim is made with reference to every compulsory system in the country. A doctor was here the other day and testified with reference to the deficiency of the compulsory system in New Zealand. At the same time I was receiving letters from medical men in New Zealand claiming that the situation there was vastly improved and that the medical profession was becoming more satisfied with it. They said that every program of this kind in its initial stages develops deficiencies, but they claim that it is being improved upon and that no one in New Zealand today would desire to change the system.

Now I think that we should let those people develop their programs and find out later on, after it has been experimented with for a sufficient period of time, whether or not these programs constitute an adequate and effective method of handling the situation.

Dr. Flagstad. Personally, I am perfectly willing to let them experiment with it, but not in the United States.

Senator Murray. That is right. We all prefer that method. I would rather profit by the experience of somebody else in speculating or investing or carrying out any activity. If someone else is successful and it proves to be a correct method, then, of course, I would like to take advantage of that. I don't like to be so biased or opposed to anything that I wouldn't consider what people have done in other parts of the world, and I am sure that Dr. Flagstad, who has testified here before so ably, will agree with me that we should not close our minds to any change.

Dr. Flagstad. I don't believe the American Dental Association will close its mind. If experiment shows that a program is desirable and effective, the American Dental Association has always changed its point of view in connection with it, but it has to be pretty clearly demonstrated that it is a good procedure for the public welfare.

Senator Murray. I understand that as a result of the inadequacy of medical and dental care the people in England found that it was absolutely necessary to adopt some other plan and they have adopted the compulsory system and are trying to work it out. The same thing is being done in other parts of the

world. These programs are in stages of experimentation yet in many of those sections of the world, and I think that we should profit by their experience.

Senator Donnell. In regard to this matter of national compulsory health insurance, I understand, Doctor, that you are not recognizing the difficulty of looking into the future. Your note this morning prophesies national health insurance as the answer to the dental health problem.

Dr. Flagstad. Not at the present time. I can't talk about the future; none of us can.

Senator Donnell. Referring to New Zealand, I have in my hand here the book *Relief and Social Security* by Mr. Lewis Merriam, issued under date of 1946, and I call to your attention this language on page 548:

The *New York Times* of October 7, 1945, reported that the Minister of Health of New Zealand stated in the House of Representatives that because of abuses, the Government is seriously considering whether free physician services will be continued. It admits widespread racketeering which followed the institution of a system under which a New Zealander may consult a physician as frequently as he likes and the doctor can collect a fee for each visit. The costs are running far higher than the Government anticipated when it instituted the system, and they constitute a serious drain on the social-security funds. Placing physicians on salary is one of the possibilities under consideration.

Now, looking back through the spectacles of today over experience, I take it that none of us would regard that type of testimony as affirmatively in favor of the success of the operation of compulsory health insurance in New Zealand, would we, Doctor?

Dr. Flagstad. No.

Senator Donnell. You wouldn't regard that as evidence in favor of our country embarking on national health insurance, would you, or compulsory health?

Dr. Flagstad. I heard a report some years ago by the medical men who made a survey of the situation, and their report was not favorable.

Senator Donnell. That is in New Zealand.

Dr. Flagstad. Yes.

Senator Donnell. Of the situation in New Zealand.

Dr. Flagstad. Yes.

Senator Murray. Before you leave that, Senator, would you give us the date of that?

Senator Donnell. 1946 is the date of the book, and the article is the *New York Times* article of October 7, 1945, as I recall it, and I will introduce it into the record a little later. Last year we had one or two *New York Times* articles, I think, bearing on this subject.

Senator Murray. Of course, other books are being written right along. There is a book now in process of publication, the book by Dr. Blanc, *Money, Medicine, and the Masses,* to be published in a very short time, which takes an entirely different view from the book that you have there of the date 1946. So the matter is being studied and is being written about. It is being debated and, as I understand in a statement a moment ago, the people of that country, the medical profession of that country, would not think of having it repealed.

Senator Donnell. At any rate, the time between 1946 and 1947 is not very extensive, is it, Doctor, to involve a total reversal in the success or lack of success in that country?

Now, may I call to your attention just one or two things. In the first place, New Zealand, as I understand, has a population of about 1,600,000, about the same as Colorado, consisting of a pastoral people very largely. There are no large cities in New Zealand that you know of.

Dr. Flagstad. I am not familiar with New Zealand, Senator. I have heard of the country but have not been there.

Senator Donnell. At any rate, I haven't been there, either, and I don't know too much about it, but we certainly haven't heard of any large cities, and a population of 1,600,000 is not at all comparable with the widely varied circumstances which exist in the United States with 140,000,000 people. We all agree with that.

Dr. Flagstad. I would say the problem would be entirely different.

Senator Donnell. Entirely different; that is correct. That is all.

Senator Smith. Before I call on the next witness, I would like to ask Senator Pepper if he has some questions.

Senator Smith. Before you proceed, Senator Pepper, I would like to ask Dr. Flagstad, do you know of any country that having adopted the compulsory system for the provision of various forms of medical care has ever repealed it?

Dr. Flagstad. I do not know of any, Senator.

You can ask the president, Dr. Mead, that question and maybe he has further information on it.

Senator Pepper. Do you favor the insurance principle at all in respect to the provision of medical care?

Dr. Flagstad. Do you mean voluntary insurance?

Senator Pepper. Do you favor the insurance principle?

Dr. Flagstad. We favor the voluntary insurance principle.

Senator Pepper. You do think that the voluntary insurance principle as applied to the provision of medical care will give the people better service than they are able to obtain under a system where the voluntary insurance principle was not in effect?

Senator Donnell. Are you talking about dental—

Dr. Flagstad. Not necessarily, Senator; no.

Senator Pepper. But I thought you favored the voluntary insurance system.

Dr. Flagstad. We favor it but that does not mean that it gives the people better care.

Senator Pepper. You do not think that it does?

Dr. Flagstad. Better than the present system? I think it might be financially easier for them to carry the load.

Senator Pepper. I believe you stated that there was a great inadequacy in dental care. To what do you attribute that, Dr. Flagstad?

Dr. Flagstad. I attribute that to a number of different things, not only to the fact that perhaps our manpower is low at the present time but also that motivation has been lacking. That is why we are in favor of dental health education. We stress that all through—to motivate the people.

Research is another thing that is essential, and you have been very kind on our bills in helping us with that particular phase. We believe that dental research will help us solve some of the problems of dental disease and eliminate some of them so we will have less to combat.

Those are the chief things, I think.

Senator Pepper. You ignore lack of adequate benefit paid for the dental care needed?

Dr. Flagstad. I think finances are a factor.

Senator Pepper. You did not mention that at all. Would you say that is not a major factor?

Dr. Flagstad. I would say "No." I would say it is a factor and that we hope with legislation to aid in overcoming that particular factor.

Senator Pepper. Is it one of the major factors?

Dr. Flagstad. I would not think so. We could ask the president, Dr. Mead, that question and see what he says.

Senator Pepper. Do you favor, yourself, the means test in eligibility for dental care?

Dr. Flagstad. It depends on what you mean by the means test. We believe that any determination of those who shall receive service, dental service, at the government's expense, shall be made by the community or state, and that the methods should not be set by the federal government. We do believe that dental care should be limited to those who are unable to pay, as I said in my statement.

Senator Pepper. Do you mean those who do not have the means to pay?

Dr. Flagstad. If you want to put it that way, all right.

Senator Pepper. Your attention was called to the resolution of your house of delegates where, as I understand it—

Dr. Flagstad. I would rather leave that resolution to the president to explain, if you will ask him, Senator Pepper.

Senator Pepper. Just one other question: Have you any recommendations? I believe you stated that the number of dentists existing at the present time in the country is inadequate to provide the people the dental care they need.

Dr. Flagstad. I think that is true.

Senator Pepper. Have you any plan to propose; do you consider that the Taft bill will meet that deficiency?

Dr. Flagstad. I think the national health bill will help meet it.

Senator Pepper. How?

Dr. Flagstad. By making federal money available as grants-in-aid to states to set up a dental-health program.

Senator Pepper. You do not consider that they authorize the state to provide tuition and living expenses and other means that will make it possible for students to become dentists, do you?

Dr. Flagstad. I do not quite understand the question.

Senator Pepper. You stated that in your opinion the Taft bill would aid in making more dentists available to the country, and, so far as I know, the way you get dentists is for students to go to dental schools and become gradu-

ates and then go out and practice dentistry.

Dr. Flagstad. At the present time, Senator, we are having no trouble with dental students; our schools are overflowing with dental students.

Senator Pepper. There are enough students in schools now so that when they graduate the number of dentists in the country will be adequate to give the people of the country the dental care they require?

Dr. Flagstad. I will say, "No," but I will say we will have considerably more dentists than at present.

Senator Pepper. Undoubtedly we may have more, but, I think, are we not legitimately concerned with the question of the adequacy of the dentists to serve the dental needs of the country?

Dr. Flagstad. We are concerned with setting up a program which we are able to handle at the present time.

Senator Pepper. Does the Taft bill provide such a program?

Dr. Flagstad. We have offered amendments that we think will help it make some arrangements to give more adequate care, not completely adequate care for everybody.

Senator Pepper. Is there any reason why we cannot strive for a complete plan?

Dr. Flagstad. We are striving for it. That will be a start.

Senator Pepper. What is the necessity of limiting it to less than the number of dentists necessary to meet the dental needs of the country?

Dr. Flagstad. We have only certain facilities in school to produce men. There are only a certain number of schools and they can produce only so many dentists.

Senator Pepper. Does the Taft bill provide any plan for enlargement of the number of dental schools and the provision of more school facilities to the students of the country to take dental training?

Dr. Flagstad. No; but there are plans under way. The Taft bill does not attempt to attack that problem.

Senator Pepper. Have you any amendment to offer to solve it?

Dr. Flagstad. We have the amendment in the statement, Senator, the one before you.

Senator Pepper. Does it contemplate setting up more dental schools?

Dr. Flagstad. No; but it contemplates making the program possible with the manpower we have.

Senator Pepper. But I am interested in getting dentists. How are we going to get more dentists to furnish more dental care to the country?

Dr. Flagstad. Well, up until the time of the war, our schools were not overcrowded. At the present time the schools are filled to maximum and there have been new schools established. We hope that will help. We also have some auxiliary help.

Senator Pepper. I know; but what can we do or what do you propose doing to establish more schools and provide more dental training so there will be more dentists for the country?

Why should the country go along without its dental needs being met?

Dr. Flagstad. I think we are doing quite well; at least we are making progress. The American Dental Association is encouraging the establishment of dental schools where they are necessary. There are several that have been established within the last two years by act of legislature.

Senator Pepper. Would you be willing to formulate a program and submit it to the Congress as to how Congress could help the states and other political subdivisions in providing as many dental schools as might be required to turn out the number of dentists that the country might require?

Dr. Flagstad. That would be a question for the American Dental Association's House of Delegates to determine.

We have in the American Dental Association a Council on Dental Education. The Council on Dental Education has that particular problem to deal with and the council is doing everything it possibly can to enlarge dental educational facilities.

Senator Pepper. You say, doing everything it can. Is it recommending how we might set up a federal program to aid in the building of those schools, furnishing equipment to them and acquiring personnel and making scholarships and fellowships available to the students?

Has it done all that?

Dr. Flagstad. I think it has approached the federal government for funds for improvements in schools through other organizations.

Senator Pepper. That is all. Thank you.

CASES AND COMMENTS

Dental Information for Home Nursing Visits. By Lawrence Paris, D.D.S., Dental Surgeon (R), United States Public Health Service (inactive), Lynn, Mass.

The Department of Agriculture, through the office of Labor, runs nine standard camps for migratory farm workers and their families in the northwestern states. To each camp there is allocated a registered nurse, often with public health training, who carries on a program of home nursing calls, clinic services for minor illnesses and referrals to physicians, dentists and hospitals when necessary. This report outlines the specific dental information used by nurses when making public health home nursing calls.

There are three general roads to oral health. "Clinical therapeutic dentistry" is the first; it includes fillings, oral surgical operations and prosthetic appliances. The second is "home care dentistry," which includes nutrition, mouth hygiene and all activities carried on by the person himself. The third is "clinical preventive dentistry," which will be employed more and more in the future and which includes, at present, topical applications of fluoride, the use of silver nitrate, prophylaxes and prophylactic odontotomy.

In efforts to emphasize the important "home care dentistry" section of a dental program, the home nursing visits should not be overlooked. Obviously, the public health nurse must "respect the attention limits" of her audience on a home nursing call and therefore should not attempt to teach too many points, medical and dental, on any one visit. However, the health condition of the teeth and mouth of each person is of sufficient importance in general family hygiene to warrant inclusion among the many other conditions which the nurse's teaching may be expected to improve.

The following dental points are for discussion during home nursing visits and are listed in the order of their relative importance. If time is short, one or more points may be left out of the talk.

1. Sugar: Sugar and everything containing sugar, such as candy and soda pop, should be left completely out of the diet. Sugar helps to make tooth cavities.

2. Toothbrushing: Daily home hygiene procedures will keep the oral tissues clean by getting rid of decayed food and will help prevent pyorrhea by increasing the blood circulation.

3. Toothbrushes: Toothbrushes should be kept in a clean, dry place; they should be kept in an airy place and in sunlight, if possible.

4. Dentist: Regular visits to the dentist, every six months for children and annually for adults, are advised.

5. Horror stories: Stories about dental procedures should not be told in the presence of children.

The first point mentioned above is concerned with nutrition. The public health nurse is well informed on basic nutritional problems. For dental health, emphasis is placed on lessening the carbohydrate intake. To cut carbohydrates from the diet sufficiently to have a lasting effect on dental microorganisms is impractical without more rigid, constant and expert supervision than the nurse alone is able to give. Furthermore, many lay people cannot grasp, in a short home visit, the meaning of the biochemical term carbohydrate. Therefore sugar alone is discussed. The remaining points are simple and are well understood by the patients after some small explanation.

From past experience, the nurses and I feel that teaching these points during the home nursing visits has been of considerable value to the dental program and therefore to the general health program as well.—*12 West Baltimore Street.*

Acrylic Splints for Athletes: Transparent Slip Casings for the Teeth as a Protection From Blows. By Rodney Lilyquist, D.D.S., Los Angeles.

Among games of sport, the contests involving bodily contact are the most popular, and it is in these games that the teeth are placed in jeopardy. The ingenuity of football coaches and other interested parties has been taxed to the limit to protect the head bones and the muscles of the participants in that vigorous sport. But for the teeth no protection whatever has been devised.

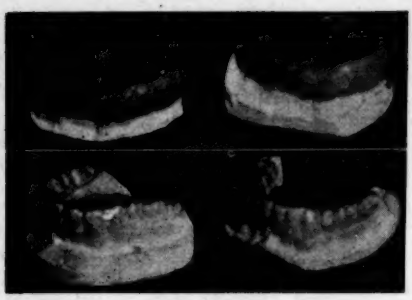


Fig. 1.—Above: Baseplate wax on models. Below: Acrylic casings on models

Recently a situation occurred which led me to find a solution to this problem. The captain and guard of a college basketball team had one of his upper central incisors struck by a teammate's elbow in a practice session. The tooth was not dislodged completely but the root was fractured. Since an important series of contests was to begin in two days, adequate treatment was impossible in the time allotted. Yet there had to be some protection in the event of another blow in the impending games.

To protect the teeth I made acrylic casings to slip over the teeth in both jaws. The process was as follows: A colloid impression of the upper and lower jaws was taken. The plaster and stone were mixed half and half to facilitate removal from the splint. The deep undercuts were filled in with plaster of paris and smoothed out with a 1 inch paint brush (with the bristles cut off to three-fourths of an inch) under running water. The maxillary teeth on the model were covered with baseplate wax to within 1 or 2 mm. above the gingival line (Fig. 1, above). The wax was heated and the teeth on the model of the mandible were pressed in approximate occlusal position. The wax was chilled. Wax was placed on the mandibular teeth and heated. Again the teeth were pressed into approximate occlusal position and the wax was chilled. The impressions were poured in stone. The models were flasked and finished in acrylic resin (Fig. 1, below, and Fig. 2). The casings were placed in the mouth and with the use of carbon paper were ground into three-point contact or better.

Fig. 2.—Acrylic splints

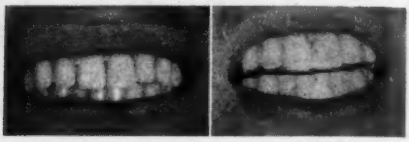


Fig. 3.—Patient's teeth without acrylic splints (left) and with acrylic splints (right)

The splints or casings fitted perfectly, and the injured tooth was afforded full protection. Mild testing blows on the outside of the covering could not be felt. Since the acrylic resin is transparent, the splints were not noticeable except on close examination (Fig. 3). The wearer experienced no discomfort, and the splints did not interfere with mouth breathing.

The success of this experiment convinced me that similar casings could be made and used for all athletes who participate in rough games. The acrylic splints are of such durability that they will resist almost any blow. The force is distributed over all of the teeth and thus is absorbed by all and not by one or a few.

For a nominal cost these casings could be made by any dentist. The outlay of a few dollars for the protection of irreplacable teeth certainly would be worth while.—*5004 York Boulevard.*

BOOK REVIEWS

Radiology For Medical Students. By F. J. Hodges, M.D., Isadore Lampe, M.D., and J. F. Holt, M.D. 424 pages, and 103 illustrations. Chicago: The Year Book Publishers, Inc.

This book is written expressly for medical students and is obviously intended to be used as a text in the authors' classes at the University of Michigan.

The subject matter is almost equally divided between diagnostic and therapeutic radiology and is written in a delightful style in simple, concise English that should appeal to both students and practitioners. No valuable paper has been wasted on commercial photographs or voluminous and tedious descriptions of apparatus, but ample text and illustrations are included to familiarize the reader with the basic principles involved in both diagnostic and therapeutic use of radiant energy.

The book is printed on gloss enamel paper which brings out the fine detail in every plate with remarkable clarity.

Since this book is intended for medical students and practitioners, the authors have wisely omitted the subject of radiodontia; and the reviewer suspects that they realize that its practice should not be undertaken by the general practitioner of medicine, a decision in which the reviewer most heartily concurs.

Considering the broadening horizon of dentistry and the importance of a thorough understanding of the effects of the roentgen ray on both normal and pathologic tissues as well as of the modern conception of its use in diagnosis, this book is highly recommended as a valuable addition to every dentist's library.—*P. G. Puterbaugh.*

A Business of My Own. By Arthur E. Morgan. 184 pages. Price $1.00. Yellow Springs, Ohio: Community Service, Inc., 1946.

Once in a great many years a book appears that portrays in a most clarifying manner a subject seldom discussed but decidedly important to a great mass of people.

Such a book is *A Business of My Own.* Although the subject of dentistry is seldom mentioned, some discussion is given to the professions of medicine, engineering, law, architecture and the ministry.

In the reviewer's opinion the real value of the book lies in the vast knowledge to be gained by the author's lucid description of the many advantages of life in a small community.

For several years Mr. Morgan has traveled widely and has made an intensive study of small independent industries in the smaller American communities. As a result, he has reached certain general conclusions: (1) "Big businesses are not necessarily longer lasting or more stable than little businesses; (2) big businesses are not inherently more profitable than small ones; (3) government supervision, such as that by the Federal Trade Commission, has partly checked the practice by some big businesses of squeezing out or throttling small competitors by unfair means; (4) a large number of small businesses are thriving in America, many of them in small communities, and (5) many more small industries would be thriving in America if there were more general awareness of their feasibility."

In chapter 1 the author adequately describes the cloud over private business, our mixed economy, centralization and decentralization, the satisfactions of business, business ethics, the question of competition, the industrial promoter and the small community. Topics are beautifully related, and the reviewer especially admired the ideas expressed in the section on business ethics. The dentist will find here a code which compares favorably with our professional code.

"Starting in Business" is the title of chapter 2. The author admonishes the young man as to the importance of starting on a small capital. The young dentist should not allow snobbishness or pride in social standing to prevent him from beginning with small capital and his own physical labor.

Chapters 3 to 6 are concerned with sources of information, including suggested reference works, how to find a market, community-wide economic development and service occupations.

The importance of good human relations is emphasized in this last chapter under the appropriate title "Personality Considerations."

Chapter 9, "Professional and Personal Services," is also of special interest to the dentist. The author offers a wealth of interesting material related to the older and newer professions. "Medical and Health Services: Clinics and Hospitals" are fully discussed, as well as

opportunities in small communities for the development of these services. The Mayo Clinic of Rochester, Minn., is cited as an outstanding example of the phenomenal growth of a clinic in a relatively small community.

The final chapters are devoted to a comprehensive description of numerous professions and vocations in small communities.

The author makes five final conclusions: (1) "There should be surveys of services furnished outside the community and paid for, and of goods and services which would be used if available; (2) careful exploration should be made of local raw materials; (3) agriculture or other major local industry should be raised to the highest feasible level; (4) industrial services should be developed which will bring in enough additional outside money or other resource to make possible balancing the local budget, and (5) industry can be made a part of the life of the good community and need not be in conflict with it."

The reviewer desires to credit the author with having written an outstanding treatise. He belongs to the group of tireless and gifted pioneers for creative endeavor, and his work will permanently enrich the social heritage.—*Lloyd H. Dodd.*

Les Problèmes de la Pratique Quotidienne (Problems of Daily Practice). By Fernand Brochère. Second edition. 505 pages, with 113 illustrations. Paris: Editions L'Information Dentaire, 1947.

The practicing dentist, provided he possesses a fluent reading knowledge of the French language, should find this second edition of Brochère's *Problems of Daily Practice* a helpful and extremely diverting volume.

Designed as a guide for the young dentist just entering practice, the book is to be regarded, says the author in his opening paragraph, "as a résumé of conversations with men experienced in the profession, consultations held before the methods of daily practice have become automatic routines which after a time are difficult to change." Although this is a serious work, covering even the most minute of daily problems, the style is distinctly different from that usually encountered in books of a similar nature written in English. Every phase of practice is presented with the typically French realistic approach to existing facts mixed with the equally French philosophy and humor and is generously illustrated with line drawings by the author in a manner calculated to "admit a little light into the darkness, and a little fresh air to the desert of the printed page."

Section I is introductory in nature, summarizing the problems of professional men, stating the characteristics necessary to successful practice and emphasizing the ethical demands of a profession. The considerable assets to be found in professional life are stressed, but the young practitioner is reminded too that financial gains are not the chief rewards of a professional man nor are they so easily come by as in purely commercial enterprise. It is pointed out that the dental field is far from overcrowded. The need for more dental care is obvious, and unless this need is properly met in France, as elsewhere, socialization of the professions will result, the author believes. This is an eventuality which he views with disfavor, believing, as he does, that governmental control will lower the quality of professional work without solving the problem which he feels can be answered by intelligent action from within the profession itself.

Included in this section is a chapter on the choosing of an office site and the methods of establishing practice and setting up the office itself. The section concludes with a detailed discussion of the Taylor System—application of scientific principles to all details of work in order to achieve the most efficient results in the shortest time, with a minimum of gestures or procedures. This system, designed principally for industrial procedures, may be applied to all types of work, the author explains. Each person may work out his own "method" based on the general system of scientific principles.

The principal requirements for professional practice are considered in Section II, including technics, materials, fees and the personal satisfaction which may be found in such practice. Physical hazards encountered in dental practice, the problem of fatigue, the matter of financing for the professional man and conditions favorable and unfavorable to a successful practice are covered. A discussion of materials and instruments and the most efficient method of arranging and employing them also is included. Ancillary aids are listed, and the benefit to the dentist from the intelligent cooperation with the workers in fields allied to dentistry is emphasized.

Section III is devoted to problems of a technical nature and includes the various phases

of operative procedures, prosthetics and orthodontics, and concludes with a chapter on minor oral surgery for the general practitioner in routine practice rather than for the specialist in this field.

Section IV concerns itself with the compensations of professional life. The dentist's leisure time is discussed, and the advisability and even necessity for regular periods of daily rest and relaxation are pointed out. The final chapter details methods of collections and patient recall and concludes with the reminder that true economy for the dentist is the economy of his own strength, an economy to be achieved through careful gaging of his own abilities and endurance and limiting his practice accordingly.

A short chapter written by the author's wife concludes the book. Madame Brochère emphasizes the place of the wife in the life of the professional man and explains how she may help or hinder his practice. A table of contents and list of biographical references are included. —*Martha A. Mann.*

Manual for Dental Technicians With a Supplement on Acrylics. By J. A. Salzmann, D.D.S. 346 pages, with 286 illustrations. St. Louis: C. V. Mosby Company, 1946 (reprint).

This book was first published in 1938 and supplied a great need as there has been little written on dental laboratory procedures especially for the technician. The book was out of print for several years, and those who were unable to obtain copies will be glad to know that it has been reprinted and that a supplement on acrylic resins has been added. This supplement, however, is very short, and it would have been desirable if some of the space devoted to vulcanite had been utilized to give a more comprehensive treatment of acrylic resins.

It would be fine if this book could be rewritten completely; in the meantime, the technician will find the present volume of considerable help.—*Josephine P. Hunt.*

Dental Practice and Management: Management, Economics, Ethics and Psychology in Dentistry. By E. R. Swank, D.D.S., B.M. 318 pages, and 43 illustrations. Cloth. Price $5.00. Philadelphia: Lea and Febiger, 1947.

Beginning with mention of the advances made in the standards of living since the turn of the century, the author goes on to relate those made in every phase of dental science with "the single exception of that which relates to the management of dental practice as a business enterprise."

In chapter 1 the author stresses the need for self analysis and a systematic conduct of the dentist's practice as a business enterprise.

Chapter 2 deals with "The Elements of Professional Practice." This discussion embodies an analysis of professional ability, and several pages of interest are devoted to personality and business methods. Between these last two topics are a few paragraphs regarding location. One statement by the author, "The city dentist is probably much better informed on the advances of his profession, especially in his own particular branch, than is the general practitioner in the country," will be challenged by many members of our profession.

"Your Office" is the title of chapter 3. The author portrays splendid ideas regarding office arrangement and consideration of color and its psychologic effect on patients, and several pages are devoted to an extensive survey of the importance of proper lighting. The chapter heading is a bit misleading, in that a discussion of the control of pain is included.

Chapter 4 is concerned with records. Dr. Swank's many years of unrelenting study in this field are reflected in a most comprehensive display of complete records for the dental office.

Fees are considered in chapter 5, and the author gives a number of general ideas for their establishment. The importance of a thorough examination of the patient is stressed as an essential basis for the establishment of fees.

In chapter 6, "Credit and Collection," valuable advice is given regarding credit ratings, causes for credit delinquency, complaints and methods of collection.

Chapters 7, 8 and 9 are entitled "Letter Writing and Announcements," "Advertising," and "The Office Assistant." This last chapter contains a lucid description of the duties of an assistant.

Chapter 10, "Pedodontia," in which both pedodontia and orthodontia are discussed, might well have been omitted, since both subjects are irrelevant to the subject of the book. The same applies to chapter 11 in which the relation of medicine and dentistry is discussed.

Chapter 12 deals with the reason why people do not buy professional services. Many statistics are presented concerning analysis of

family incomes and economic conditions of the dental practitioner. The author stresses the "dominant need for a changed psychological approach and practice management methods."

Chapter 13 is entitled "The Psychology of Attracting and Handling Patients." Many provocative statements and a few contradictory remarks are made. The words "selling" and "salesmanship" predominate throughout the entire chapter. The word "truth" would have been better. If the dentist constantly tells the truth he does not need to resort to selling technics.

On page 229 the author states that "the secret of dealing with people is to let them arrive at their own conclusion of their own free will." On page 247, under the third step in development of a skilled salesman, he speaks of ". . . the practical use of psychology to influence a prospective patient and bend his will to that of the dentist." Again on page 250 these words are repeated.

The redeeming feature of this chapter is a list of the factors that influence people to select one particular dentist. This list is quoted from George W. Crane, professor of psychology, Northwestern University, who asked 225 adults to give their reasons for their selection. The results are quite interesting.

Chapter 14, "Ethics," is the best in the book. The material on self appraisement is especially well written and highly informative.

"Jurisprudence" is the heading of chapter 15. The author gives an excellent résumé of the legal aspects of dentistry, of especial value to the recent graduate.

The final chapter is concerned with the subjects of living, vacations and hobbies. The reviewer is in hearty accord with the author's ideas concerning the vast importance of the dentist's need for adequate vacations and one or more hobbies.

All in all, the author has produced a book which reflects years of intensive study. Although many persons are given to circumspection when reading books on practice management, the reviewer believes that this book is well worth while.—*Lloyd H. Dodd.*

Root Canal Therapy. By Louis I. Grossman, M.D., Dr. med. dent. Second edition. 354 pages, with 94 engravings. Price $5.50. Philadelphia: Lea & Febiger, 1946.

Refinements in the practice of root canal treatment since the first publication of this book in 1940 have resulted in this second edition. The entire book has been revised completely, and many new illustrations and 117 pages have been added.

The history of root canal treatment is given, as well as a detailed consideration of the problems of treatment. Included are chapters on the anatomy of the root canal, principles of treatment, sterilization of the canals and periapical tissue, filling of the root canal and root resection. The chapter pertaining to the pulpless tooth and focal infection is especially noteworthy and complete. Elsie Gerlach's chapter on the treatment of root canals in deciduous teeth is again included.

A discussion of aerodontalgia, its causes and methods of treatment, has been added. The use of penicillin, streptomycin and the sulfonamides in root canal treatment is covered as completely as present day knowledge permits. A chapter on the treatment of fractured and traumatized teeth has been added also. Discussions of the technic of immediate root resection and filling of the root canal after resection of the root apex have been added to the chapter on root resection.

This edition is a valuable up-to-date textbook for all who are interested in root canal treatment.—*David Berman.*

English-Spanish Chemical and Medical Dictionary. Edited by Morris Goldberg. 692 pages. Price $10. New York: McGraw-Hill Book Company, Inc., 1947.

More than 40,000 English words with their Spanish equivalents are listed in this volume of terms employed in medicine, surgery, dentistry, veterinary medicine, biochemistry, biology, pharmacy and allied sciences. Edited by Morris Goldberg, chief technical translator of the Translation and Research Bureau, New York, the book is primarily a translator's tool, of value principally to those concerned with translation from English into Spanish. Initial listings are in English and are followed by a translation into Spanish of the English word and a streamlined definition of the term in Spanish only. All explanations are brief, comparable to the basic definitions customarily found in leading medical dictionaries. There is no elaboration on various types and classifications of the anatomic parts, diseases, instruments and therapeutic agents such as appears in the dictionary designed for the use of the student or research worker. The similarity be-

tween many Spanish and English words employed in scientific terminology and the simplicity of the Spanish textbooks make this a volume readily intelligible to the person who is familiar with scientific vocabulary and who has a basic knowledge of the Spanish idiom. —*Martha A. Mann.*

The Principles and Practice of Medicine. By Henry A. Christian, M.D., A.M. Sixteenth edition. 1,539 pages. Price $10. New York: D. Appleton-Century, Inc., 1947.

Osler's original edition of this book appeared in 1892. This current edition is the latest of a long series dealing with the various phases of medicine.

Publication of the present edition was timed to incorporate numerous diseases that have become commonplace in the English speaking countries since World War II. Addition of new words to the scientific vocabulary and recognition of new disease entities have made a new edition of the book mandatory. Together with the new infectious diseases that are now described, the entire psychosomatic phase of medicine has assumed new importance in relation to medical practice.

This book, or one incorporating the information included in it, should be read by every physician and dentist. The volume is well indexed, and at times the text assumes almost the character of an encyclopedia but retains some of the flavor that was introduced by Osler and maintained by some of the early editors, particularly McCrae.

It is practically impossible to incorporate, even in encyclopedic form, all of the immense amount of information that has been added to current medical knowledge. Advances in methodology and epidemiology have been accelerated greatly through introduction of the antibiotics. Practical use of the sulfonamides and, particularly, of penicillin is still open to considerable discussion. These substances, of course, are entirely new in accepted medical literature. Many of the old, previously accepted procedures have been discarded in favor of the new; or, the character of the disease being more thoroughly understood, its form of treatment has been changed entirely. Discussions of two diseases, typhoid fever and pneumonia, occupied extensive portions of the text in previous editions. These diseases have not changed in actual importance, but the method of treatment and the mortality related to them have been changed so that other diseases are, therefore, relatively increased in importance.

The volume is poorly bound and the quality of the paper leaves something to be desired. Despite these shortcomings the book cannot be recommended too highly for the purpose for which it was intended.—*Wayne B. Slaughter.*

Rhinoplasty and Restoration of Facial Contour. By Jacques W. Maliniac, M.D. 327 pages, with 214 illustrations. Price $7.50. Philadelphia: F. A. Davis Co., 1947.

This book is of interest primarily to those specializing in plastic surgery and is interesting because of some of the unusual technics described.

The content of the book is almost exclusively devoted to rhinoplasty and correction of the deformities of the nasal complex. The procedures described are not for the most part of interest to those practicing dentistry in any of its phases.

It is felt that the descriptions of injuries to the paranasal sinuses are not of the caliber that would be of value to those interested primarily in the oral cavity.

Also, it is felt that the bibliography is misleading. The men who actually are contributing to the literature in this field are incompletely represented, and the work of a limited few is emphasized. The book has a limited use as a reference work.—*Wayne B. Slaughter.*

CURRENT LITERATURE

Dental Service at the 2nd Medical General Dispensary, Frankfort, Germany. James Cunningham. Mil. Surgeon 101:220, September 1947.

The author describes the dental clinic of this dispensary which originated in London but was later transferred to Frankfurt when the Army went from combat to occupation duties and headquarters were established there.

Each of the twenty-five dental officers who were assigned to the clinic had his own permanent equipment and completed his own cases. A specialist in prosthetics was assigned to the clinic's laboratory on the main floor. On the floor above was the central dental laboratory for the zone, excellently outfitted with modern equipment and materials. German civilians, replacing enlisted men, were trained for assisting at the chair and for laboratory work. A communications system connected the main desk, the waiting room and the operating offices, increasing the efficiency of the entire dental program.

The clinic serviced officers and enlisted men, and although it was under a heavy constant demand for appointments and emergency treatments, it maintained a high level of dental care and contributed greatly to the morale of the men. The clinic was also popular with authorized civilians and allied military personnel.

The large turnover of patients afforded opportunity to study various manifestations of dental disease and to experiment with new technics of bridge and denture construction. Clinics of this type permit dental officers who are recent graduates to gain a wide experience in different fields under the supervision of older dentists.—*James Springer.*

The Effect of Topically Applied Fluorides on Dental Caries Experience. V. Report of Findings With Two, Four and Six Applications of Sodium Fluoride and of Lead Fluoride. Donald J. Galagan and John W. Knutson. Pub. Health Rep. 62:1477, October 10, 1947.

The authors present a study of the incidence of dental caries in six groups of children in Miami County, Ohio, in which three of the groups received two, four and six topical applications of a 2 per cent solution of sodium fluoride and three groups received two, four and six topical applications of a 0.06 per cent lead fluoride solution to the teeth in half the mouth. Half the children in each group were treated on the right side of the mouth and the other half on the left side. The teeth in the untreated quadrants served as controls. The fluoride treatment series was preceded by a dental examination and prophylaxis, and applications were administered at the rate of two a week. The follow-up examinations were made one year after completion of the fluoride treatments.

The results of the study indicate that four applications of a 2 per cent solution of sodium fluoride are the minimum number required to give maximum reduction in caries incidence. Two applications of sodium fluoride resulted in 21.7 per cent less initial caries in treated teeth than in untreated teeth; four treatments reduced initial caries in treated teeth by 40.7 per cent, and six resulted in a 41.0 per cent reduction. No significant reduction was shown with two, four or six applications of a saturated lead fluoride solution.—*James Springer.*

The Family and Dental Disease. V. Caries Experience Among Parents and Offspring Exposed to Drinking Water Containing Fluoride. Henry Klein. Pub. Health Rep. 62:1247, August 1947.

This investigation is concerned with the question: Do children who drink fluoride waters all their lives (and average low DMF rates) show a variation in caries susceptibility related to that shown by their parents?

The water supply of the population studied (southwestern New Jersey) was accidentally fluorinated in 1927, when the water sources were changed from shallow wells (presumably fluorine-free) to deep wells containing naturally from 1.4 to 2.2 parts per million of fluoride. Thus the opportunity was presented to study the relation between the condition of the teeth of parents not exposed to fluorine waters during childhood and the condition of the teeth of their offspring exposed to fluorine waters since birth. The author reports on the examination of 123 fathers and 131 mothers mainly between the ages of 30 and 50 years

and 205 children of both sexes between the ages of 5 and 19 years.

Children with a continuous exposure to fluoride water since birth are as a group protected from caries attack in a varying degree dependent on familial susceptibility. Those least protected are children whose parents show the highest tendency toward dental disease, and those most protected are children whose parents show the lowest tendency toward dental disease. Exposure to an environmental factor (fluorine in diet) will reduce the amount of caries attack but not sufficiently to obscure the influence of the familial factor which may be constitutional in origin.—*James Springer.*

Human Infection Caused by Lactobacilli. E. Biocca and A. Seppilli. J. Infect. Dis. 81:112, September-October 1947.

In two fatal cases of septicemia and endocarditis, micro-organisms whose bacteriologic characteristics were similar to those of oral lactobacilli were isolated on repeated occasions. In both cases (a man aged 42 and a woman aged 32) there was a history of previous cardiac involvement. In the first case there was a recent dental lesion consisting of a fistula and an abscess containing an osseous sequestrum, and the other patient had had recent extractions because of granulomas.

The authors point out that the occurrence of chains of coccobacilli, particularly definite after repeated cultures in milk, necessitates careful examination to differentiate coccobacilli from streptococci. On the basis of their experimental inoculations in mice and chick embryos, the authors indicated that the strains of lactobacilli isolated were endowed with a moderate virulence and that in all probability the clinical severity of the reported cases depended on the special localization, perhaps on previously damaged cardiac valves and not on invasiveness or toxicity of the micro-organisms in themselves.

Since lactobacilli occur so frequently in the oral cavity and are thought to be associated with dental caries, the authors stress in conclusion the possibility that virulent or virulented lactobacilli could be agents of dental and then generalized infection. They designate with the generic term "Lactobacillosis" such an infection caused by lactobacilli, which until now were considered nonpathogenic.—*Frank J. Orland.*

Journal of Oral Surgery
April 1947

Titles marked with an asterisk (*) are reviewed below.

*Clinical Study of Repair of Bone After Alveolectomy. John F. Svoboda, Chicago.—91.

*Pentothal Sodium Anesthesia by Way of the Sternum. Howard E. Kessler, San Diego, Calif.—106.

*Preliminary Report on the Use of Tantalum in Maxillofacial and Oral Surgery. Don H. Bellinger, Detroit.—108.

*The Value of Writing Case Histories. Reed O. Dingman and James R. Hayward, Ann Arbor, Mich.—123.

*Nitrous Oxide and Potent Synergists in Oral Surgery. Harry M. Seldin, New York.—131.

*Fear, Pain and Anesthesia. Phillip E. Williams, Dallas, Texas.—141.

*Double Lip. Reed O. Dingman and Howard Billman, Ann Arbor, Mich.—146.

*Stomatitis After Administration of Penicillin. Joseph Farrington, Durham, N. C.; David Abbott and James M. Glenn, Cincinnati.—149.

*Solitary Central Giant-Cell Tumor of the Jaw Bones. Adolph Berger, New York.—154.

Bilateral Condylar Fractures. Douglas B. Parker, New York.—168.

Fracture of the Mandible With Non-Union and Bone Graft. Douglas B. Parker, New York.—171.

*Anthrax of the Oral Cavity. Orville C. Briggs, Fort Wayne, Ind.—173.

*Drifting or Migrating Teeth. Joseph P. Wahl, New Orleans.—174.

Clinical Study of Repair of Bone After Alveolectomy. John F. Svoboda.

The sectional method of simulating alveolectomy was used on two selected edentulous persons in order to study the effects of the procedure on recovery and repair of bone and soft tissue. Sections of bone and soft tissue were taken for histologic study at various intervals after the operative procedures.

From the clinical and histologic observations made in the study it can be concluded that there are two main stages in the healing process of alveolar bone. The first is the immediate or reactive stage, seen immediately after injury to the bone. The second is the transformation stage, which may persist throughout life. The transformation stage can be demonstrated histologically as well as

clinically. It is characterized by the development of an osteoid tissue resembling bone, and the process usually begins about three weeks after operation. It is at this time that dentures may be constructed. In the transformation stage the reparative processes are confined to the connective tissue adjacent to the bone surface.

Pentothal Sodium Anesthesia by Way of the Sternum. Howard E. Kessler.

Kessler reports a case of an obese man, aged 60, on whom no veins were visible or palpable and to whom thiopental sodium was administered successfully by way of the sternum. The method of administration is described. Attending dangers mentioned are entry into the mediastinum and bone infection.

Preliminary Report on the Use of Tantalum in Maxillofacial and Oral Surgery. Don H. Bellinger.

The biologic significance and the physical and chemical properties of tantalum are described at length. The history of the use of tantalum in surgical operations is also discussed.

Tantalum was used in the treatment of 25 patients for a wide diversification of purposes. In 11 cases, the wire, 0.025 of an inch in diameter, was used for open reduction of fractured mandibles or for retention of bone grafts. In no case was the removal of the wire necessary because of lack of tolerance by the tissues.

Tantalum wool was used in 5 cases and was found useful in creating and restoring facial contour and symmetry. The loosely woven wool serves as a skeleton through which repair of fibrous tissue occurs.

Tantalum sheet, 0.020 of an inch thick, was used for splinting the segments of the mandible for 4 patients after resection for malignant growth. These splints are intended only to retain the bone segments in their proper anatomic position until and if bone grafting becomes advisable.

Exposure of the metal to the mouth does not seem to interfere with its tolerance by the tissues. In 1 case, in which the splint was exposed, it was eventually covered by growth of mucous membrane.

Eight case reports are given describing the various uses of tantalum.

In conclusion the author requests that the paper be regarded as a preliminary report. He states that study of a larger series of cases after a greater lapse of time may result in different conclusions.

The Value of Writing Case Histories. Reed O. Dingman and James R. Hayward.

The importance of taking a careful case history in pathologic conditions of the oral cavity is stressed. A condensed form of outline for reference during history taking should include, in this order: chief complaints, present illness, past history, systemic review, and family and social history. "Present Illness" should be a chronologic development of events leading to the chief complaint. The patient should develop this in his own words as much as possible. In some cases, the facts regarding the present illness must be drawn from the patient by careful questioning. Under "Present Illness" should be included the mode of onset of the disease or complaint, the course, any treatment for relief and constitutional symptoms that may be pertinent to the disease in establishing a diagnosis.

Many examples are mentioned in which a careful history determined the diagnosis. The many subheadings are elaborated and well illustrated in the outline.

Nitrous Oxide and Potent Synergists in Oral Surgery. Harry M. Seldin.

With regard to general anesthetics, clinical dental experience has universally selected nitrous oxide as the drug of choice. It is noninflammable and nonexplosive and it forms no compounds within the body tissues. When prolonged and severe hypoxia is avoided, nitrous oxide neither interferes with nor alters the body functions. Recovery is rapid because the anesthetic is quickly reversible. For the difficult and complicated cases requiring an anesthetic in which nitrous oxide with oxygen is inadequate, vinyl ether (Vinethene, Merck), Metopryl and thiopental sodium may be used as synergists in conjunction with it, or each may be used individually according to indications.

Patients who are poor risks for anesthesia may be placed in either of two categories: (1) the debilitated type or (2) the overstimulated type.

Patients with anemia and cardiac disease are of the debilitated type. Procaine is best

for the patients with cardiac disease. A high percentage of oxygen is essential in the anesthetic mixture for the anemic patient to prevent tissue hypoxia.

The alcoholic addict, the most common of the overstimulated type, invariably will resist anesthetization, and to force the nitrous oxide and oxygen during the struggle which usually ensues is extremely hazardous, since the patient may suddenly pass from the excitement to the dangerous fourth stage.

The use of thiopental sodium as a synergist with nitrous oxide is described in detail.

Fear, Pain and Anesthesia. Phillip E. Williams.

Any drug which will produce sufficient hypnosis to spare the patient the dread of an operation, without endangering his welfare or creating difficulties in local or general anesthesia, must be welcomed as a desirable adjunct to preanesthetic medication.

Many other phases of treatment for the fear-ridden patients are enumerated. Considerable stress is placed on the patient-dentist relation and the psychologic approach to patients giving evidence of fear.

Double Lip. Reed O. Dingman and Howard Billman.

Double lip consists of an accessory fold of redundant tissue in the mucosal portion of the lip just inside the vermilion border of the mucous membrane. It is a true congenital deformity. Cosmetic correction is the principal reason for surgical intervention. Surgical removal is described and illustrated.

Stomatitis After Administration of Penicillin. Joseph Farrington, David Abbott and James M. Glenn.

Stomatitis venenata, glossitis and cheilitis are complications that may occur with the use of penicillin by mouth. The stomatitis is similar to that caused by other agents on contact. There is some evidence that a deficiency of nicotinic acid may be associated with treatment with penicillin by mouth. The authors contend that this phase is in need of more investigation.

Solitary Central Giant-Cell Tumor of the Jaw Bones. Adolph Berger.

Berger favors the conception that the pathogenesis of the central giant-cell tumor of the jaw bones is similar to that of the giant-cell tumor of long bones but that the tumor of the jaw bones is less aggressive than that of long bones.

The vacuolated roentgenographic appearance is no longer regarded as pathognomonic.

The author reports six varied cases that are well illustrated with photomicrographs and roentgenograms. Of the 6 patients, 2 were treated surgically with no recurrence. Four patients received roentgen therapy. In all these cases, too, the lesion healed and filled in, and there has been no recurrence.

Anthrax of the Oral Cavity. Orville C. Briggs.

Briggs reports a case of a girl, aged 17, who complained of a swelling in the roof of the mouth. The swelling had begun three days before the patient was seen. Twenty days later there was extensive edema, pustules with bright red bases and vesicles. Roentgenograms of the area at the time revealed no remaining bony structure.

A smear of the exudate from one of the vesicles revealed anthrax bacillus. Antianthrax serum was administered at the time, and three weeks later swelling had disappeared and roentgenograms showed a condensing process.

The possible source of infection was thought to be a newly purchased toothbrush at a ten-cent store. The brush had probably been made in Japan.

Drifting or Migrating Teeth. Joseph P. Wahl.

A case is reported of two embedded teeth that were first discovered on the lingual side of the mandibular central incisor and cuspid. Five years later roentgenograms revealed that the teeth had drifted to a position just buccal to the first and second molar on the same side. The teeth were removed with no complications.—*H. L. Hubinger.*

LIST OF DENTAL OFFICERS

SEPARATED FROM ARMY DENTAL CORPS

THE following list of dental officers separated from the Army Dental Corps does not include rank because such information is no longer furnished by the Surgeon General's Office. Publication will be given to other names as soon as possible.

Alabama	
Piedmont	Ginter, Orville P.
Arkansas	
Monette	Tucker, Lloyd E.
California	
Dinuba	Oh, Edward
Fresno	Golden, John C.
Hollywood	Miller, John D.
Long Beach	Garron, Martin D.
Long Beach	Johnson, Ernest R.
Los Angeles	Alexander, Howard
Oakland	Diamond, Morris L.
Piedmont	Bertelsen, Elmer V.
San Anselmo	Albert, Richard H.
San Diego	Jepson, Donald G.
San Francisco	Hicken, Benjamin A.
San Francisco	Johnson, Bruce J.
San Francisco	Maass, Andrew C.
San Francisco	Stackpoole, Edward V.
Willows	Brown, Thomas E.
Colorado	
Denver	Cornell, Carlyle P., Jr.
Connecticut	
New Britain	Eichenbaum, Irving W.
West Haven	Mullen, Francis R.
Westport	Neilsen, Harry B.
District of Columbia	
Washington	Daugherty, Darien B.
Washington	DuBois, George J.
Washington	O'Brien, Robert J.
Georgia	
Atlanta	Barrett, Luther L.
Atlanta	Meissner, Oscar C.
Atlanta	Proctor, Eugene C.
Augusta	Goldstein, Meyer
Illinois	
Chicago	Akan, John J.
Chicago	Bezkostny, William J.
Chicago	Kowalski, John S.
Chicago	Lennox, Benedict J.
Chicago	Meyer, Lester
Chicago	Mueller, George B.
Chicago	Pape, Gilbert T.
Chicago	Potempa, Andrew J.
Chicago	Rosenfeld, Leon
Danville	Devine, Mark W.
East St. Louis	Dixon, Charles M.
River Forest	Frymark, August J.
Indiana	
Greencastle	Krider, Wayne J.
Iowa	
Alton	Riedeman, Dores J.
Kansas	
Topeka	Fleisch, Louis M.
Kentucky	
Blaze	Lewis, Herbert B.
Louisville	Pinto, Philip J.
Maine	
Portland	Miller, David S.
Maryland	
Baltimore	Eskin, Albert C.
Baltimore	Levy, Herbert S.
Massachusetts	
Brookline	Balicer, Leon B.
Melrose	Eich, Frank A., Jr.
Reading	Bredbury, Gerald F.
Winthrop	Cassidy, Arthur E.
Michigan	
Ann Arbor	Maclachlan, Duncan P.
Detroit	Aptekar, Gerald R.
Detroit	Green, Meyer H.
Detroit	Kavanaugh, Harry M.
Detroit	Leversuch, Frederick V. A.
Detroit	Olen, Sam L.
Muskegon Heights	Mixer, Daniel C.
Minnesota	
Cokato	Hendricks, Lambert M.
Louis Park	Johnson, Roy A.
Sandstone	Larson, Milton G.
Mississippi	
Columbia	Faust, John M.
Greenville	Crowder, Herman M., Jr.
Missouri	
Kansas City	Hodge, Meredith V.
St. Louis	Emerson, Caldwell G.
St. Louis	Osterholtz, Raymond H.

St. Louis	Winterhoff, Walter J.
University	Boggiano, Merle J.
Warrensburg	Guilliams, Calvin J.
Montana	
Glasgow	Wedum, Otis L.
Roundup	Pearson, Joseph E.
Nebraska	
Lincoln	Pierson, Fritz A., Jr.
Syracuse	Kendle, Walter E.
New Jersey	
Jersey City	Karp, Alfred
North Bergen	Kohn, Sidney I.
Union City	Prandoni, Harry F.
New York	
Bronx	Schneier, Saul
Brooklyn	Goldstein, Harry J.
Brooklyn	Meadow, Irving H.
Brooklyn	Onesti, Vincent R.
Brooklyn	Pearson, Philip I.
Brooklyn	Vogel, George
Corona	Fiasconaro, Joseph E.
Forest Hills	Fox, Julius
Mamaroneck	Lurcott, Horace V.
Mount Vernon	Areinoff, Walter
New York	Ambrose, Robert I.
New York	Colby, Ira S.
New York	Comassar, Morris
New York	Ettenson, Myron E.
New York	Fisher, Raymond
New York	Kraus, Louis
New York	Lederman, Abraham
New York	Livingston, John E.
New York	Rieser, Julian M.
North Bellmore	Levy, Leonard R.
Patchogue	Dranitzke, Samuel
St. Johnsville	Rapacz, John
Woodhaven	Morgenlender, Harvey
North Carolina	
Angier	Collins, Thomas G.
Morrisville	Hamilton, Robert P.
St. Pauls	Moore, Luther J., Jr.
Ohio	
Akron	Litman, Jack H.
Brecksville	Vosatka, Frank J.
Dayton	Bader, Robert
Dayton	Kesler, Donald W.
Youngstown	Lowery, Lew J.
Oregon	
Freewater	Ellis, Lawrence S.
Portland	Hoffman, George M.
Salem	MacLafferty, Robert S.
Pennsylvania	
Beaver Falls	Keiser, John T.
Brockway	Black, John L.
Conshohocken	Fritz, Chester O.
Conshohocken	Leary, Joseph F.
Darby	Bycer, Abraham E.
Drexel Hill	Cherry, George
Easton	Messina, Samuel L.
Mount Carmel	Hick, Thomas A.
New Castle	Gilchrist, Arthur J., II
New Castle	Oles, Henry J.
Philadelphia	Englander, Horace H.
Philadelphia	Miller, Milton J.
Philadelphia	Musial, Walter A.
Pittsburgh	Ludwig, Ned H.
Pittsburgh	Rand, Paul
Uniontown	Strawberry, Carl W.
Rhode Island	
Newport	Carr, Edward B., Jr.
Providence	Lewis, Abraham B.
South Carolina	
Landrum	Gould, Charles K.
Mount Pleasant	Edwards, Morton T.
Nichols	Gilmore, Edward C.
Tennessee	
Holladay	Merrill, Bob K.
Nashville	Nixson, Marvin O.
Texas	
Henderson	Hillin, John H.
Santa Anna	Konze, Charlie F.
Shamrock	Hail, James D.
Utah	
Salt Lake City	Dedekind, Kenneth L.
Virginia	
Richmond	Fressola, Alfonso J.
Richmond	Longan, William J.
Washington	
Spokane	Scott, Jack T.
Vancouver	Shore, David J., Jr.
West Virginia	
Huntington	Emmert, Paul R.
Wisconsin	
Shawano	Mitton, William W.
Wyoming	
Buffalo	Long, Harvey J.

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

THE following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Alabama		
Albertville	Evans, David J.	Lieut.
Notasulga	King, William R.	Lieut.
Arizona		
Jerome	Krause, Dean R.	Lieut.
California		
Los Angeles	Carlson, Melvin H.	Lieut.
Modesto	Eastin, Donald C.	Lieut.
Pasadena	Taylor, Robert L.	Lieut.
San Diego	Capralis, George	Lieut.
San Francisco	Nishkian, B. Haig	Lieut.
Colorado		
Denver	Zarlengo, Dante V.	Lieut.
Kersey	Kinkade, John H., Jr.	Lieut.
Connecticut		
Bridgeport	Mazur, George J.	Lieut.
Hartford	Block, Louis H.	Lieut.
West Hartford	Finley, Francis L.	Lieut.
Georgia		
Macon	Brooks, Charles H., Jr.	Lieut.
Savannah	Hester, John R.	Lieut.
Idaho		
Potlatch	Stalsberg, Roy A.	Lieut.
Illinois		
Harvey	Madory, George B.	Lieut.
Indiana		
Bedford	Richards, John, Jr.	Lieut.
Campbellsburg	Standish, Samuel M.	Lieut.
Indianapolis	Jennings, Richard E.	Lieut.
Kansas		
Mission	Gerster, Evlynn O.	Lieut.
Kentucky		
McHenry	Watts, William P.	Lieut.
Louisiana		
New Orleans	Ballina, Dario F.	Lieut.
New Orleans	Bassich, Raymond P., Jr.	Lieut.
Maine		
Portland	Seidel, John H.	Lieut.
Maryland		
Baltimore	Brown, Bernard L.	Lieut.
Massachusetts		
Pittsfield	Ryan, Leo T.	Lieut.
Reading	Bemister, Robert H.	Cmdr.
Taunton	Kiernan, Leo E.	Lieut.
Michigan		
Detroit	Kems, Harry	Lieut.
Williamston	Overholt, Robert L.	Lieut.
Minnesota		
Duluth	Gold, Calvin N.	Lieut.
Minneapolis	Quinn, Donald A.	Lieut.
Minneapolis	Swanson, H. R.	Lieut.
St. Paul	Cohler, Lyle W.	Lieut.
Sleepy Eye	Schwartz, Lloyd E.	Lieut.
Mississippi		
Rosetta	Johnson, Albert S.	Lieut.
Montana		
Hamilton	Myrick, Floyd F.	Lieut.
Nebraska		
David City	Lanspa, Norman W.	Lieut.
Lincoln	McGee, Harry E., Jr.	Lieut.
Red Cloud	Weesner, James	Lieut.
New Jersey		
Elizabeth	Bell, Archie H.	Lieut.
Neshanic	Shteir, Elliot	Lieut.
Roselle Park	Sprague, Charles A.	Lieut.
South River	Alexander, Raymond D.	Lieut.
New York		
Baldwinsville	King, Robert W.	Lieut.
Bronx	Wachtel, Nathan	Lieut.
Bronxville	Hudson, William C.	Lieut.
Brooklyn	Ettinger, Martin	Lieut.
Brooklyn	Herman, Ernest	Lieut.
Brooklyn	Jacobs, William R.	Lieut.
Brooklyn	Stillman, Abram J.	Lieut.
Brooklyn	Stollar, Leo	Lieut.
Brooklyn	Stratico, Thomas F.	Lieut.
Buffalo	Kielich, Raymond B.	Lieut.
Corona	Scandurra, Anthony J.	Lieut.
Flushing	Stone, Arnold	Lieut.
Long Island	Kornfeld, Morris M.	Lieut.
New York	Arnold, Herbert	Lieut.
New York	Faust, Leonard	Lieut.
New York	Goldstein, Harry H.	Lieut.
Scottsville	Angelincy, John P.	Lieut.
Solvay	Tindall, Arthur J.	Lieut.
Valley Stream	Bloom, Jerome E.	Lieut.
Yonkers	Rosenberg, Arnold	Lieut.

North Carolina		
Raleigh	Seifert, David W., Jr.	Lieut.
North Dakota		
Casselton	Lier, Philip T.	Lieut.
Ohio		
Akron	Chapman, Ira S.	Lieut.
Bellaire	Maurer, Donald E.	Lieut.
Canton	Briggle, William F.	Lieut.
Cleveland	Horvath, Leslie	Lieut.
Cleveland	Kofol, John H.	Lieut.
Lakewood	Tomey, William H.	Lieut.
Lockland	McKibben, Wilbur R.	Lieut.
Oregon		
Portland	Fey, Harold C.	Lieut.
Portland	Reiter, Philip	Lieut.
Pennsylvania		
Millvale	Peterson, Robert H.	Lieut.
Towanda	Burchill, Joseph M.	Lieut.
Puerto Rico		
Vega Baja	Prado, Pedro I.	Lieut.
Rhode Island		
Providence	Bornstein, Marshall K.	Lieut.
Texas		
Dallas	Wilborn, William A.	Lieut.
Houston	Jacobe, Howard W., Jr.	Lieut.
Virginia		
Bedford	McIver, James	Lieut.
Washington		
Spokane	Baxter, Gordon F.	Lieut.
Walla Walla	Batfany, Francis F.	Lieut.
West Virginia		
Beckley	Sisson, Francis J.	Lieut.
Wisconsin		
Beaver Dam	Seyferth, Roger C.	Lieut.
Campbellsport	Pesch, John F.	Lieut.
Kenosha	Panlener, James A.	Lieut.
Madison	Stitgen, Vincent C.	Lieut.
Milwaukee	Schuh, Howard J.	Lieut.
Racine	Buckley, Daniel E.	Lieut.
Wyoming		
Casper	Brown, Stanley H.	Lieut.

DEATHS

Armstrong, William H., Springfield, Mass.; School of Dentistry, University of Pennsylvania, 1901; died October 29; aged 75.

Baldwin, R. E., Memphis, Tenn.; School of Dentistry, Vanderbilt University, 1908; died October 30.

Bemister, Robert H., Reading, Mass.; Atlanta-Southern Dental College, 1940; died October 22; aged 32.

Bischoff, Courtney O., Leechburg, Pa.; School of Dentistry, University of Pennsylvania, 1918; died October 8; aged 51.

Blumberg, Solomon, Philadelphia; died October 27; aged 62.

Boswell, Edgar F., Kansas City, Mo.; Western Dental College, 1917; died November 3; aged 56.

Botkin, W. J., Farmland, Ind.; died November 10; aged 79.

Brown, Cyril D., Cameron, Mo.; died October 30; aged 49.

Bryans, H. Herbert, Birmingham, Ala.; Atlanta Dental College, 1916; died October 30; aged 56.

Carey, Frank H., Terre Haute, Ind.; died October 24; aged 76.

Carleton, Sanger S., Stone Ridge, N. Y.; Baltimore College of Dental Surgery, 1908; died October 19; aged 64.

Carpenter, Minor M., Keokuk, Iowa; Keokuk Dental College, 1905; died October 7; aged 68.

Carrier, Stephen F., Newtonville, Mass.; Dental School, Harvard University, 1900; died October 19; aged 70.

Collins, Ralph E., Sturgis, Mich.; Chicago College of Dental Surgery, 1898; died November 15.

Corwin, John A., Kewanee, Ill.; died October 31; aged 86.

Currer, G. R., Sloan, Iowa; Dental School, Northwestern University, 1903; died October 20; aged 68.

Darby, George D. B., Philadelphia; School of Dentistry, University of Pennsylvania, 1889; died November 6; aged 79.

Diedrich, Ralph L., Colton, Calif.; College of Dentistry, University of Southern California, 1924; died September 7; aged 53.

Douglas, Theodore, Franklin, Ind.; Indiana Dental College, 1904; died November 1; aged 77.

Dufner, James J., Minneapolis; Kansas City Dental College, 1909; died October 16.

Esterly, George A., Lawrence, Kansas; Kansas City Dental College, 1898; died October 11.

Fowler, Milburn M., Chevy Chase, Md.; Tufts College Dental School, 1913; died October 27; aged 56.

Gardner, Paul L., Jackson, Mich.; College of Dental Surgery, University of Michigan, 1912; died October 22; aged 64.

Geiger, Paul H., Peoria, Ill.; died October 25; aged 72.

Graham, J. M., Tullahoma, Tenn.; School of Dentistry, Vanderbilt University, 1891; died September 20; aged 91.

Greer, Hugh D., Topeka, Kansas; died October 29; aged 82.

Gutierrez, Marcel, San Francisco; Venezuela Dental School, 1897 and Chili Dental School, 1912; died October 31; aged 82.

Haffner, Frederick L., Crestwood, N. Y.; School of Dentistry, University of Pennsylvania, 1919; died October 17.

Haigh, Herbert, Long Beach, N. Y.; College of Dental and Oral Surgery of New York, 1906; died October 18: aged 69.

Haynie, G. E., Wakeeney, Kan.; died September 22; aged 68.

Heck, Raymond, Spickard, Mo.; Western Dental College, 1913; died October 31; aged 62.

Herte, William M., Milwaukee; died October 27; aged 72.

Hibbs, George W., Winthrop, Maine; died October 8; aged 45.

Hodgdon, Elmer E., Cambridge, Mass.; died October 18; aged 76.

Hopkins, Hugh B., East Peoria, Ill.; College of Dentistry, University of Illinois, 1908; died October 28; aged 70.

Kelsey, J. H., Erie, Pa.; Dental Department, University of Toronto, 1900; died November 4; aged 70.

Langley, James W., St. Louis; died October 22; aged 79.

LeGro, Albert L., Grosse Point, Mich.; died November 1; aged 72.

Lynch, William F., Somerset, Mass.; Baltimore College of Dental Surgery, 1911; died October 16; aged 58.

McDonald, Ralph W., Brockway, Pa.; died October 22.

Maetzold, C. J., Red Wing, Minn.; Chicago College of Dental Surgery, 1920; died November 8; aged 54.

Miller, J. E., Charleston, W. Va.; died October 11; aged 82.

Peteet, James W., Dallas, Texas; State Dental College, 1918; died November 1; aged 56.

Phelps, Leland E., Tampa, Fla.; Chicago College of Dental Surgery, Dental Depart-

ment of Loyola University, 1905; died October 7; aged 65.

Pierce, Alonzo T., Magnolia, Miss.; died September 14; aged 80.

Reed, Joseph J., Beloit, Wis.; Chicago College of Dental Surgery, 1885; died November 7; aged 85.

Ridley, John M., El Paso, Texas; School of Dentistry, Vanderbilt University, 1907; died November 7; aged 66.

Russell, William F., Sylva, N. C.; died October 28; aged 52.

Sims, Benjamin C., Charlottesville, Va.; School of Dentistry, Medical College of Virginia, 1917; died June 12.

Slocum, Alfred, Ithaca, N. Y.; School of Dentistry, Temple University, 1893; died November 1.

Stephens, Winston, East Longmeadow, Mass.; Baltimore College of Dental Surgery, 1894; died October 24; aged 83.

Swerdlow, Samuel C., Columbus, Ohio; Oregon College of Dentistry, 1932; died November 1; aged 38.

Tileston, LeRoy, Louisville, Ky.; Louisville College of Dentistry of Centre College, 1914; died September 25; aged 57.

Walter, Clyde L., Portland, Ore.; School of Dentistry, North Pacific College of Oregon, 1924; died November 5; aged 56.

Ward, Rush J., Gilbert, W. Va.; died October 22; aged 70.

Weaver, Homer A., Minneapolis; College of Dentistry, University of Minnesota, 1907; died November 5; aged 77.

Wenig, B. J., New Hampton, Iowa; College of Dentistry, University of Iowa, 1915; died November 7; aged 58.

White, Albert C., Palenville, N. Y.; died November 12.

Wilson, George W., Milwaukee; Dental School, Marquette University, 1914; died November 11; aged 57.

Wood, Charles A., Los Angeles; Baltimore College of Dental Surgery, 1898; died October 26; aged 76.

Woods, William H., Jasper, Mo.; died October 29; aged 72.

DIRECTORY

Officers

H. B. Washburn, President.....Lowry Bldg., St. Paul
Clyde E. Minges, President-Elect.....Peoples Bank Bldg., Rocky Mount, N. C.
Philip E. Adams, First Vice-President.....106 Marlborough St., Boston
Fred A. Richmond, Second Vice-President.....Huron Bldg., Kansas City, Kan.
A. M. Smith, Jr., Third Vice-President.....Stovall Bldg., Tampa, Fla.
Harold Hillenbrand, Secretary.....222 E. Superior St., Chicago
R. H. Volland, Treasurer.....First National Bank Bldg., Iowa City

Board of Trustees

LeRoy M. Ennis, 1950, Third District.....4001 Spruce St., Philadelphia
Harold W. Oppice, 1950, Eighth District.....1002 W. Wilson Ave., Chicago
O. H. Moen, 1950, Ninth District.....Watertown, Wis.
Daniel F. Lynch, 1950, Fourth District.....1678 Primrose Road, N. W., Washington, D. C.
J. E. John, Sr., 1950, Fifth District.....804 Medical Arts Bldg., Roanoke, Va.
J. B. Carr, 1949, Seventh District.....Hume Mansur Bldg., Indianapolis
C. S. Foster, 1949, Tenth District.....Dows Bldg., Cedar Rapids, Iowa
Robert P. Thomas, 1949, Sixth District.....Francis Bldg., Louisville, Ky.
Henry Hicks, 1949, First District.....5 Glen Court, Greenwich, Conn.
William McGill Burns, 1948, Second District.....80 Hanson Place, Brooklyn
Willard Ogle, 1948, Twelfth District.....Medical Arts Bldg., Dallas, Texas
Fred S. Shandley, 1948, Eleventh District.....Medical & Dental Bldg., Seattle
R. C. Dalgleish, 1948, Thirteenth District.....124 State Capitol, Salt Lake City

Bureaus

Chemistry: Donald A. Wallace, Director, and J. Roy Doty, Senior Chemist, 222 E. Superior St., Chicago.

Library and Indexing Service: Murrell Wellman, Librarian; Josephine P. Hunt, Associate Librarian, 222 E. Superior St., Chicago.

Public Information: Herbert B. Bain, Director, 222 E. Superior St., Chicago.

Section Chairmen

Dentistry for Children and Oral Hygiene: Robert A. Downs, Colorado State Department of Health, State Office Bldg., Denver.

Full Denture Prosthesis: Homer Simpson, Medical Arts Bldg., Dallas, Texas.

Histology, Physiology, Pathology, Bacteriology and Chemistry (Research): Basil G. Bibby, Eastman Dental Clinic, Rochester, N. Y.

Hospital Dental Service: W. Harry Archer, Professional Bldg., Pittsburgh.

Operative Dentistry, Materia Medica and Therapeutics: Ernest R. Granger, 149 Prospect Ave., Mt. Vernon, N.Y.

Orthodontics: Frank W. Nash, Medical Arts Bldg., Scranton, Pa.

Partial Denture Prosthesis: A. O. Klaffenbach, 226 River St., Iowa City.

Periodontia: Harold J. Leonard, 745 Fifth Ave., New York.

Practice Management: Gaylord J. James, 9400 Euclid Ave., Cleveland.

Radiology: L. R. Main, 3556 Caroline St., St. Louis.

Standing Committees

American Red Cross: George A. Coleman, Chm., 15th and Locust Sts., Philadelphia.

Constitution and Administrative Bylaws: Percy T. Phillips, Chm., 18 E. 48th St., New York.

Dental Education: Wilbert Jackson, Chm., Clinton, N. C.; Harlan H. Horner, Secy., and Shailer Peterson, Director of Educational Measurements, 222 E. Superior St., Chicago.

Dental Health: Hugo M. Kulstad, Chm., First National Bank Bldg., Pomona, Calif.; Allen O. Gruebbel, Secy., 222 E. Superior St., Chicago.

Dental Legislation: Carl O. Flagstad, Chm., Medical Arts Bldg., Minneapolis; George H. Fox, Secy., 222 E. Superior St., Chicago.
Dental Museum: Henry A. Swanson, Chm., 1726 Eye St., N. W., Washington, D. C.; Joseph L. Bernier, Secy., Army Institute of Pathology, Washington, D. C.
Dental Therapeutics: Thomas J. Hill, Chm., Western Reserve University, Cleveland; Donald A. Wallace, Secy., 222 E. Superior St., Chicago.
Economics: Leslie M. FitzGerald, Chm., Roshek Bldg., Dubuque, Iowa.
History: Harold L. Faggart, Chm., 2120 Pine St., Philadelphia.
Insurance: A. D. Weakley, Chm., 1726 Eye St., N. W., Washington, D. C.; Fred A. Richmond, Secy., Huron Bldg., Kansas City, Kan.
International Relations: Stanley D. Tylman, Chm., 55 E. Washington St., Chicago.
Judicial Council: Ernest G. Sloman, Chm., 344-14th St., San Francisco.
Library and Indexing Service: John E. Gurley, Chm., 350 Post St., San Francisco.
Membership: Paul W. Zillmann, Chm., 29 Walden Ave., Buffalo; Harold Hillenbrand, Secy., 222 E. Superior St., Chicago.
Military Affairs: Robert T. Curren, Chm., Illinois Bldg., Springfield, Ill.
Motion Pictures: Cecil C. Connelly, Chm., 4660 Maryland Ave., St. Louis.
National Board of Dental Examiners: W. H. Crawford, Chm., School of Dentistry, University of Minnesota, Minneapolis; Gordon L. Teall, Secy., Hiawatha, Kan.
Nomenclature: Harry Lyons, Chm., Professional Bldg., Richmond, Va.
Patents and Honorary Awards: M. D. K. Bremner, Chm., 173 W. Madison St., Chicago; Frederick C. Baker, Secy., Calumet Bldg., Hammond, Ind.
Prosthetic Dental Service: F. W. Herbine, Chm., 230 N. Fifth St., Reading, Pa.; Earl M. Eaton, Secy., American Trust Bldg., Cedar Rapids, Iowa.
Relief: Thomas R. Cullen, Chm., 189 W. First St., Oswego, N. Y.; L. H. Jacob, Secy., Jefferson Bldg., Peoria, Ill.
Research: M. D. Huff, Chm., Medical Arts Bldg., Atlanta, Ga.; Charles B. Hall, Secy., 1835 Eye St., N. W., Washington, D. C.
Scientific and Health Exhibits: Leo F. Marré, Chm., Paul Brown Bldg., St. Louis.

Special Committees

Dental and Medical Relations: Louie T. Austin, Chm., Mayo Clinic, Rochester, Minn.
Horace Wells Centenary: Eugene M. Clifford, Chm., 57 Pratt St., Hartford, Conn.
Hospital Dental Service: W. Harry Archer, Chm., Professional Bldg., Pittsburgh.
Trade Relations: Edward J. Jennings, Chm., 126 W. State St., Trenton, N. J.
War Memorial: Louis H. Renfrow, Chm., Selective Service, 21st and C Sts., N. W., Washington, D. C.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
222 East Superior Street, Chicago 11, Illinois
WHItehall 6730 Cable Address: ADAECO

Lon W. Morrey, Editor **John J. Hollister, Business Manager**

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association. *Articles* are accepted with the understanding that they have not been published previously and that they are submitted solely to THE JOURNAL. *Advertising:* All products coming within the scope of the Council on Dental Therapeutics of the American Dental Association must be acceptable to the Council in order to be advertised in THE JOURNAL. Subscription is included in the annual membership dues of the American Dental Association. The subscription rate is $7 a year payable in advance for domestic subscriptions and $8 a year for foreign subscriptions. *Notice of change of address* should be received one month before the change is to be effective.

ANNOUNCEMENTS

MEETINGS OF STATE SOCIETIES

State	Date	Place	Secretary	Address
Alabama	April 15-17	Birmingham	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona			B. K. Litt	68 E. Congress, Tucson
Arkansas	May 2-5	Little Rock	D. M. Hamm	Clarksville
California	April 26-28	San Francisco	L. E. Linehan	450 Sutter St., San Francisco
S. California	March 29-31	Los Angeles	M. E. Ralston	903 Crenshaw Bldg., Los Angeles 6
Colorado	June 14-16	Glenwood Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut	May 19-21	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. Krygier	309 S. State St., Dover
D. of Columbia			K. H. Wood	202-1835 Eye St., N. W., Washington
Florida			J. I. Todd	433 St. James Bldg., Jacksonville
Georgia			J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii	Oct. 28-31	Lihue	J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho			R. Sutcliff	Twin Falls
Illinois	May 20-22	Springfield	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 17-19	Indianapolis	L. E. Ewbank	Kingman
Iowa	May 3-5	Des Moines	A. N. Humiston	417 Higley Bldg., Cedar Rapids
Kansas	May 2-5	Wichita	F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky	April 5-7	Louisville	J. L. Walker	640 Barbee Way, S., Louisville
Louisiana	April 8-10	Alexandria	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine	June 6-8	Portland Springs	P. W. Anderson	32 Deering St., Portland
Maryland	May 3-5	Baltimore	J. H. Shackelford	706 Baltimore Life Bldg., Baltimore 1
Massachusetts	May 3-6	Boston	P. E. Adams	227 Commonwealth Ave., Boston 16
Michigan	April 12-14	Detroit	F. Wertheimer	Michigan Department of Health, Lansing
Minnesota	Feb. 23-25	St. Paul	C. V. E. Cassel	Lowry Medical Arts Bldg., St. Paul
Mississippi	May 31-June 2	Biloxi	F. C. Sneed	Osyka
Missouri	April 25-28	Jefferson City	C. W. Digges	Exchange National Bank Bldg., Columbia
Montana	May 6-8	Great Falls	C. S. Renouard	305 Phoenix Bldg., Butte
Nebraska	May 10-12	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada			L. G. Jacob	505 Chestnut St., Reno
New Hampshire	June 27-29	Jefferson	F. E. Williams	814 Elm St., Manchester
New Jersey	April 20-23	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 24-26	Santa Fe	J. S. Eilar	First National Bank Bldg., Albuquerque
New York	May 10-13	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	April 26-28	Asheville	R. F. Hunt	Rocky Mount
North Dakota	May 9-12	Minot	A. L. Smeby	Northwood
Ohio	Nov. 7-10	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	April 11-14	Tulsa	E. W. Wise	Medical Arts Bldg., Tulsa
Oregon	Feb. 5-7	Portland	W. H. Hurley	407 Selling Bldg., Portland 5
Panama Canal Zone			T. W. Cagle	Box 243, Cocoli
Pennsylvania	May 11-13	Atlantic City, N.J.	E. R. Aston	421 Market St., Kingston
Philippine I.			G. A. Carreon	9 Broadway, Third St., N. Manila
Puerto Rico			R. Miranda	Box 747, Rio Piedras
Rhode Island	Jan. 19-21	Providence	S. Ozarin	172 Thames St., Newport
South Carolina	May 2-4	Greenville	J. R. Owings	201 E. North St., Greenville
South Dakota	May 9-11	Sioux Falls	E. W. Elmen	Sioux Falls
Tennessee	May 24-27	Memphis	E. J. Justis	Exchange Bldg., Memphis
Texas	April 12-15	Fort Worth	W. Ogle	313 Medical Arts Bldg., Dallas
Utah			S. Ballinger	1001 Tribune-Telegram Bldg., Salt Lake City
Vermont	May 23-25	Woodstock	J. A. Larrow	Middlebury
Virginia	April 12-14	Richmond	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	Jan. 29-31	Seattle	F. J. Dingler	1502 Medical & Dental Bldg., Seattle 1
West Virginia	May 20-22	Clarksburg	C. J. Gavelda	Clarksburg
Wisconsin	March 30-April 1	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee
Wyoming			J. D. McNiff	208 Grand Ave., Laramie

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Arizona	April 1-4	Phoenix	R. K. Trueblood	25 N. Second Ave., Glendale
California	Feb. 9 June 14 July 26	San Francisco Los Angeles San Francisco	K. I. Nesbitt	Room 203, 515 Van Ness Ave., San Francisco 2
District of Columbia	Jan. 5	Washington	H. A. Swanson	1726 Eye St., N.W., Washington
Massachusetts	Feb. 3-5	Boston	J. C. Wilson	413 N. State House, Boston
Michigan	Feb. 2	Ann Arbor	J. L. Champagne	502 David Whitney Bldg., Detroit 26
Minnesota	Jan. 5		E. E. Comartin	100 First Avenue Bldg., Rochester
Mississippi	June 15		M. B. Pearce	New Albany
North Carolina	June 28-July 1	Raleigh	F. O. Alford	1109 Liberty Life Bldg., Charlotte 2
North Dakota	Jan. 11-15	Fargo	W. J. Ford	Fargo
Wisconsin	Feb. 16-20	Milwaukee	S. F. Donovan	Tomah

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
Akron Dental Society, Eighth Annual Children's Dental Health Week	Feb. 1-7	Akron	L. A. Graham Chm.	405 E. Cuyahoga Falls Ave., Akron
American Academy of Oral Pathology, Second Annual Meeting	Feb. 8	Chicago	H. B. G. Robinson Editor	College of Dentistry, Ohio State University, Columbus 10
American Association of Endodontists	Feb. 7-8	Chicago	M. K. Hine Pres.	1121 W. Michigan St., Indianapolis 2
American Association of Orthodontists	April 27-29	Columbus	M. E. Ernst Secy.	1250 Lowry Medical Arts Bldg., St. Paul
American Board of Orthodontics	April 23-26	Columbus	B. G. deVries Secy.	705 Medical Arts Bldg., Minneapolis 2
American Dental Association, Eighty-Ninth Annual Meeting	Sept. 13-17	Chicago	H. Hillenbrand Secy.	222 E. Superior St., Chicago 11
American Dental Society of Europe	July 27-30	London	K. C. Campbell Secy.	88 Portland Place, London, W. 1
Chicago Dental Society	Feb. 9-12	Chicago	A. L. Brett Secy.	30 N. Michigan Ave., Chicago 2
Cincinnati Dental Society March Clinic Meeting and Children's Dental Health Day	March 14-16	Cincinnati	R. L. Holle	Doctors Bldg., Cincinnati 2
Denver Dental Association, Forty-First Annual Mid-Winter Meeting	Jan. 11-14	Denver	K. F. Grove Chm.	1325 E. 16th Ave., Denver
Greater Philadelphia Annual Meeting	Feb. 4-6	Philadelphia	R. Adams Secy.	501 Stock Exchange Bldg., 1411 Walnut St., Philadelphia 2
Northeastern Society of Orthodontists	March 1-2	Atlantic City, N. J.	O. Jacobson Secy.	35 W. 81st St., New York
Third All India Dental Conference	Feb. 19-22	Bombay	H. D. Merchant Organizing Secy.	Reception Committee, All India Dental Conference, 1948, Sambava Chambers, Sir Phirozshah Mehta Road, Bombay 1
Thomas P. Hinman Mid-Winter Clinic	March 21-23	Atlanta, Ga.	F. A. Daniel Gen. Chm.	1023 Doctors Bldg., Atlanta 3, Ga.
Washington University Dental Alumni, Eighty-Second Annual Meeting	March 5-6	St. Louis	V. P. Thompson Secy.	234 W. Lockwood, Webster Groves 19, Mo

INTERNSHIPS, EXTERNSHIPS, RESIDENCIES AND FELLOWSHIPS

Boston City Hospital, Boston. Oral Surgeon-in-Chief, Stephen P. Mallett.

The Children's and Infants' Hospital (a Unit) of Boston. Address Paul K. Losch, 300 Longwood Ave., Boston

Children's Hospital, Pittsburgh. Address C. W. Hagan.

The Children's Memorial Hospital, Chicago. Administrator, Mabel W. Binner, 707 Fullerton Ave., Chicago.

City Memorial Hospital, Winston-Salem, N. C. Superintendent, J. B. Whittington.

Columbia University, School of Dental and Oral Surgery, New York. Associate Dean, Bion R. East, 630 W. 168th St., New York 32.

Delaware Hospital, Inc., Wilmington. Medical Director, Delaware Hospital, 501 W. Fourteenth St., Wilmington 13.

Eastman Dental Dispensary, Rochester, N. Y. Director, Basil G. Bibby.

Elizabeth Steele Magee Hospital, Pittsburgh. Address W. Harry Archer, 804 Professional Bldg., Pittsburgh.

The Forsyth Dental Infirmary for Children, Boston. Director, Percy R. Howe, 140 The Fenway, Boston.

George F. Geisinger Memorial Hospital, Department of Oral and Maxillofacial Surgery, Danville, Pa. Address James B. Smith.

International Grenfell Association, New York. Staff Selection Committee, 156 Fifth Ave., New York.

Jewish Sanitarium and Hospital for Chronic Diseases, New York. Director, Leonard Kohn, Dental Division, E. Forty-Ninth St. and Rutland Road, Brooklyn 3, N. Y.

Joseph Samuels Dental Clinic of the Rhode Island Hospital, Providence.

Montefiore Hospital, Pittsburgh. Address I. Z. Lasday.

New York Foundling, New York. Medical Director, Alfred J. Vignec, 175 E. Sixty-Eighth St., New York.

Notre Dame Bay Memorial Hospital, Twillingate, Newfoundland. Address John M. Konopka, 25 W. Independence St., Shamokin, Pa.

Richmond Freeman Memorial Clinic for Infants and Children, Dallas, Texas. Executive Director, Dora B. Foster, 3617 Maple Ave., Dallas.

St. Francis Hospital, Pittsburgh. Address R. J. Englert.

University of California, College of Dentistry, San Francisco. Dean, W. C. Fleming, University of California, Medical Center, San Francisco.

University of Illinois, Graduate School, Chicago. Fellowships for Research and Graduate Work. Secretary, Committee on Graduate Work in Medicine, Dentistry and Pharmacy, 1853 W. Polk St., Chicago 12.

University of Illinois, Research and Educational Hospital, Chicago. Supervisor of Hospital Dental Services, Maury Massler, University of Illinois, 808 S. Wood St., Chicago 12.

University of Oregon, Medical School and Hospitals, Portland. Administrator, Charles N. Holman, 3181 S.W. Marquam Hill Road, Portland.

University of Rochester, School of Medicine, Rochester, N. Y. Fellowships for Research and Graduate Work in Dental Sciences. Dean, George H. Whipple.

Veterans Administration. Address L. D. Heacock, Chief Dental Research and Training Division, Dental Service, Washington, D. C.

Walter G. Zoller Memorial Dental Clinic, University of Chicago. Director, J. R. Blayney, 950 E. Fifty-Ninth St., Chicago 37.

West Penn Hospital, Pittsburgh. Address J. A. Gardner.

Western State Psychiatric Institute and Clinic, Pittsburgh. Address W. Harry Archer, 804 Professional Bldg., Pittsburgh.